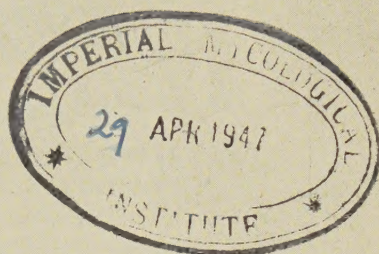


PANORAMA
of
Agricultural Research
-TEXAS-



The Abundant Life

Pictured on the front cover of this report is a long-range view across portions of the pastures and fields of one of the substations. Earth is giving of her sustenance to produce pasture crops in the foreground, and young corn just across the fence, with strip crop rotations of oats and quadroon grain sorghums in the other fields.

In the foreground are 20 steers carried on pasturage for 389 days, then fattened in the feed lot for 99 days. They paid for their feed and had 340 pounds of beef left over to pay for pasturage.

The sheep are the station's breeding flock, used for the raising of lambs, as a means for keeping the pastures free from weeds, and for marketing excess feedstuffs.

A weed patch in 1936, the creek bottom pasture in the foreground now has a good stand of Bermuda and buffalo grasses. Grazing with sheep was started in 1937 and cattle were added in 1939. From 1938 through 1945, the net annual income from livestock products on this pasture, excluding labor, has been \$13.90 per acre.

This scene portrays balanced agriculture as both long preached and practiced by branches of the Agricultural and Mechanical College of Texas, though crops and conservation methods in the background are not distinct enough in this picture to show to best advantage.

TEXAS AGRICULTURAL EXPERIMENT STATION

C. H. McDOWELL, Acting Director

College Station, Texas

Fifty-Eighth Annual Report

1945



Panorama of Agricultural Research



AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS

GIBB GILCHRIST, President

Preface

The Texas Agricultural Experiment Station is an extramural branch of the Agricultural and Mechanical College of Texas, and is under the supervision of its board of directors through the College president, the vice president for Agriculture, and the Station director.

Created in 1888 by the Texas Legislature in accepting provisions of the Federal Hatch Act, the Station is composed of three main sections embracing 19 functional divisions with headquarters at College Station and 19 substations together with 13 field laboratories, which are located in the principal agricultural regions of Texas.

To give the people of the State a panorama of agricultural research as conducted throughout its system, the Station again has selected a representative number of researches to discuss and illustrate for this 1945 annual report.

Experiments omitted are by no means considered any less important than the ones included. The 1944 annual report was similar in general treatment of subject matter, therefore, the current report has been concentrated on research projects which were not portrayed last year, and on projects initiated during 1945.

Panorama of Agricultural Research

— TEXAS —

FIFTY-EIGHTH ANNUAL REPORT — 1945
TEXAS AGRICULTURAL EXPERIMENT STATION

By
C. H. McDOWELL, Acting Director

Soil Improving Legumes for East Texas

OF THE many legumes tried so far, hairy vetch has proved to be the most consistent and dependable winter-growing legume for soil improvement in the sandy land region of East Texas, Figure 1. At the Tyler station, the use of vetch as a green-manure crop in a two-year rotation of cotton and corn has greatly reduced losses from erosion and has increased the yield of cotton 84 percent, and practically doubled the yield of corn.

In the work at Tyler, it has been found better to plant vetch after corn and have cotton follow the vetch. This is true for two reasons: Corn is usually planted before cotton and the early preparation of the land for corn requires that the vetch be plowed under before it makes sufficient growth, and the trashy condition of the corn land on which the vetch is planted prevents erosion better than the clean plowed cotton land.

At College Station, plowing under vetch fertilized with 500 pounds of 0-8-4 fertilizer increased the yield of cotton about 40 percent during the nine years, 1937-45. In 1945, corn which received the residual effect of the vetch the second year produced 42.5 bushels per acre as compared with 34.6 bushels on the untreated soil. Plowing under vetch fertilized with 200 pounds of superphosphate per acre increased the yield of sorghum silage 40 percent.

In these experiments the above-ground growth of fertilized vetch averaged adding 106 pounds of nitrogen per acre to the soil annually, while unfertilized vetch added 68 pounds. The soil where the fertilized vetch was plowed under supplied the growing crop of cotton with two to three times as much nitrogen as the unfertilized soil.

During the two years, 1944 and 1945, six methods of preparing the land and seeding vetch for cotton were compared:

1. Sowing the vetch seed broadcast and flat breaking the land to cover the seed.
2. Planting the vetch with a grain drill on unprepared land.
3. Bedding the land and seeding the vetch in "twin" drills on the beds.
4. Plowing the land and planting the vetch with a grain drill.
5. Broadcasting the vetch seed and running a sweep or buster between the cotton rows to cover the vetch seed.
6. Seeding the vetch with a grain drill on disked land.

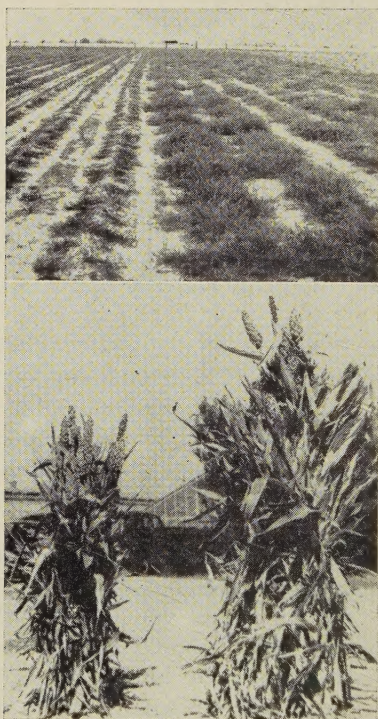


Figure 1. At top, vetch planted on ridges; at right vetch fertilized with 200 pounds of 20 percent superphosphate per acre; at left vetch not fertilized. At bottom, sorghum following fertilized vetch (at right) produced 40 percent more silage than sorghum following unfertilized vetch, at left.

In 1945, cotton following vetch planted on plowed land produced about 25 percent more lint than cotton following vetch planted on ridges. During the two years, 1944-45, however, the treatments of seeding the vetch on plowed land and plowing the land after broadcasting the vetch seed made the largest average yields, 223 and 225 pounds of lint per acre, respectively. These yields were significantly higher than the yield of cotton following vetch planted on ridges. During wet winters and springs, however, vetch thrives better on ridges or beds because of the better drainage provided by the beds.

Cotton in a two-year rotation with hubam clover produced an average yield of 300 pounds of lint per acre during the three years, 1943-45, which was 48 percent more than the yield of 202 pounds for cotton grown continuously on the same land.

In cooperative experiments at Lockhart, in the Blackland belt, plowing under vetch fertilized with 300 pounds of 20 percent superphosphate per acre practically doubled the yield of cotton, and unfertilized vetch increased the yield 73 percent. At Chilton, soil on which Austrian winter peas

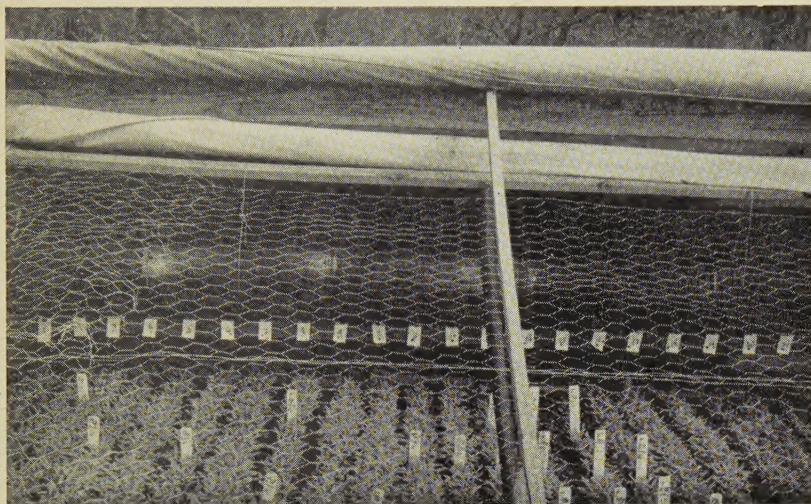


Figure 2. Section of a wood-frame hot bed (8x30 feet) with a stove-pipe flue suspended from rafters. Two other stove-pipe flues are buried 1½ inches deep at the furnace and 5 inches deep at the other end. The two sheets are on separate poles, one about 10 inches above the other which provides an air space between the sheets and additional covering usually is unnecessary. The poultry wire keeps out animals and leaves. The tomato seedlings shown here are large enough for transplanting to the cold frames.

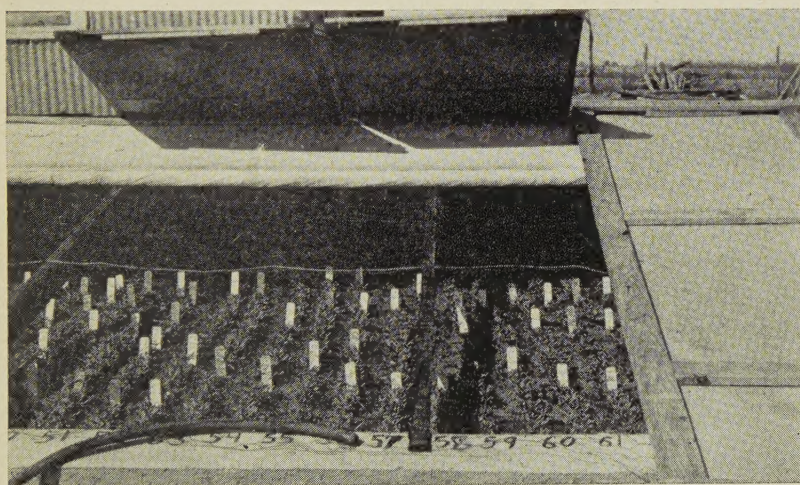


Figure 3. Section of 8x32-foot hot bed with concrete walls resting on clay subsoil. The bed is covered by two cloth sheets on roll poles and metal sheets (3x10 feet). When not in use as covers, the metal sheets are pushed back over the edge of the hot bed to deflect the wind. The soil is warmed by 300 feet of lead-covered, 220-volt heating cable placed in lines 1 foot apart and 5 inches deep in soil. A row of ten 100-watt electric lights suspended from the rafters at the back of the hot bed serve to heat the air and provide light for the seedlings.

were plowed under yielded 655 pounds of seed cotton per acre, or 58 percent more than the untreated soil.

Successful Tomato Hot Beds

Successful methods for producing tomato seedlings have been developed at the tomato disease laboratory at Jacksonville. An 8x32-foot concrete-walled hot bed and an 8x30-foot wooden hot bed are shown in Figures 2 and 3 respectively. The concrete walls are permanent and they exclude moles, ants and gophers that commonly damage seedlings. Roll poles make it easy to handle the sheet covers. Metal sheets keep out excess rain, Figure 3.

Air in the hot bed was heated by electric lights or a stove-pipe flue. The soil in the hot bed consisted of a layer 6 inches deep of well-rotted manure and leaf-mold. It was fumigated with chloropiorin to kill any nematodes and to reduce damping-off fungi. When soil is fumigated each year, it can be used safely for three or more years to avoid the expense of replacement. The soil was heated with stove-pipe flues or an electric heating cable. Excessive heat should be avoided and the seedlings should be given plenty of water so that the soil can be heated safely.

Tomato seedlings require much direct sunlight for normal growth. Since a single tomato sheet removes about 90 percent of the light, only weak seedlings can grow under sheets in hot beds. Control of damping-off and production of healthy, hardy seedlings that will survive sand storms and light frosts depend on removal of the sheets from the hot beds practically every day when the temperature is above 38° F, except during hard rain.

Keratitis of Cattle

Efforts of the Angleton station were directed towards preparing a vaccine from the hemophilus organism responsible for keratitis, or pink eye in cattle. Twenty batches of vaccine were prepared, of which 10 were used in an effort to immunize 38 Hereford calves, which were divided into three groups. The amount administered and the concentration of the vaccine varied with each group. On the 38 head vaccinated, 12 developed a complete immunity, 12 developed a slight conjunctivitis without keratitis, whereas 14 head showed no evidence of immunity.

Cultures and infectious material from field cases were used to infect the vaccinated animals and controls. In all groups the control animals developed the disease.

Breeding Cotton for Mechanical Harvesting

For the past 18 years, Station cotton geneticists have been breeding cotton to obtain plant, boll and fiber characteristics that will be best suited for mechanical harvesting, Figures 4, 5 and 6. Hundreds of crosses have been made and the progeny have been tested to determine their reaction to machine harvesting, extracting and cleaning qualities. All of the most promising commercial varieties have also been tested. Some have been found suitable for the stripper type machine and others suitable for the picker type mechanical har-

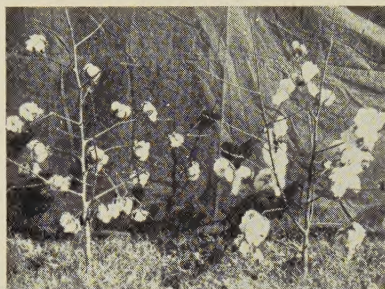


Figure 4. Comparison of fluffiness of a stormproof boll cotton with 19 bolls (left), with a normal boll cotton having 17 bolls.



Figures 5-6. Showing the effect of varietal characteristics on natural storm and machine stripped losses where delayed harvesting is practiced. Scene taken at Lubbock in late December 1945. (Above) Deltapine left and Stoneville right. Rows in center were machine stripped. Note excessive loss. Rows to each side show natural storm loss. (Below) Northern Star left and Macha, a stormproof boll type, right. Note comparative losses.

vester. A few strains have characteristics that may be suitable for any method of harvesting. In general, a variety of cotton suitable for machine harvesting should be semi-dwarf in growth, have relatively short limbs with short nodes, medium to large bolls borne singly, good storm resistance, high yield and lint turnout, and a good spinnable staple.

Varieties for machine stripping should have excellent storm resistant qualities and the locks of cotton in the boll should be compact with a minimum of fluffiness so that there is no stringing out of the locks. Tests have shown that the normal boll type with large fluffy locks is difficult to harvest with the stripper type machine without excessive losses. The extreme stormproof type of cotton is excellent for machine stripping but has the disadvantage of being hard to extract, resulting in excessive trash in the lint.

Recently strains having good storm resistance, extracting and cleaning qualities together with good yields and lint turnout especially suited to machine stripping have been developed and released to commercial cotton breeders for increase and distribution.

Mechanical pickers require a cotton that has good storm resistance, a normal boll, a fluffy lock with a high inter-seed fiber drag. The staple should be long enough to permit it to be wrapped around the picking spindle.

Considerable progress in developing strains having suitable characteristics for mechanical picking has been made but stocks of seed are not sufficient at present for distribution.

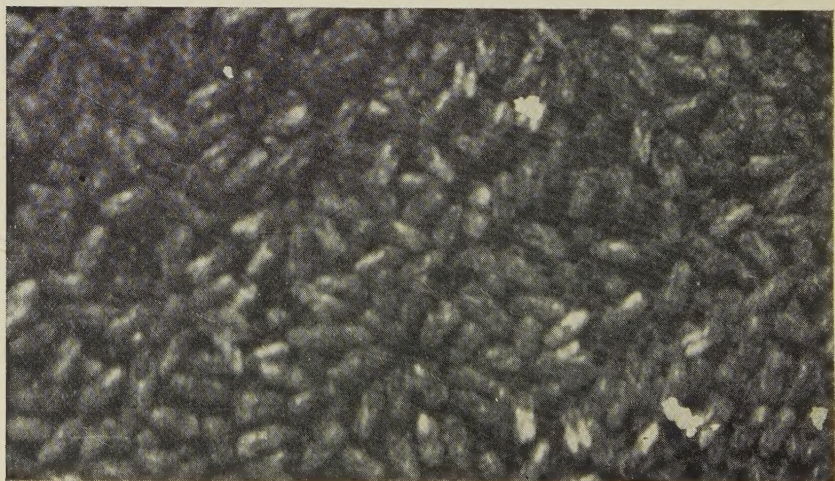


Figure 7. A comb of disease-resistant bees.

Disease Resistant Bees

Occasionally, colonies of bees have been observed to be peculiarly free of American foulbrood though exposed to infection. Station experiments have shown that through careful selection, rearing, and use of isolated yards for mating of queens, the quality of resistance to American foulbrood may be increased, Figure 7. Tests already have shown a high percentage of recovery among colonies that were inoculated.

Phosphorus Supplements Prevent "Creeps"

One of the most intensively cattle-grazed areas in Texas is the Gulf Coast region where cows are subject to "creeps," a phosphorus deficient ailment which results in heavy economic loss yearly because of lowered calf production per cow, Figure 8.

An experiment to determine practical methods of supplying additional phosphorus to range cows in an area known to be deficient in this mineral has been underway by the Station in Brooks county since 1941.

Phosphorus supplement to supply approximately $6\frac{1}{2}$ grams of phosphorus per cow daily have shown gratifying results during the production of three calf crops. Each group receiving a phosphorus supplement either in the form of bone meal self-fed or as disodium phosphate in the drinking water has produced a higher percentage of calves weighing heavier at weaning time than those produced by a control group which did not receive a phosphorus supplement. Furthermore, lactating cows receiving the benefit of additional phosphorus have remained in a much better condition of fleshing throughout the experiment. Cows which had received phosphorus supplement the past four years averaged in the fall of 1945 approximately 200 pounds heavier per head than the controls. Four of a group of 43 control cows which entered the experiment as unbred yearling heifers in July 1941,



Figure 8. The emaciated condition of this cow indicates the presence of "creeps," one of the common results of phosphorus deficiency. "Creepy" cattle thus affected get stiff in the joints and walking becomes difficult and painful. Sufficient phosphorus for best normal development and reproduction must be supplied to forage animals ranging the Gulf Coast Prairie of Texas.

have died as a result of aphosphorosis, or "creeps," since October 1945.

Regularity in calving and percent calf crop have been quite consistently maintained during three years for the cows which received a phosphorus supplement, while in the control group a smaller percentage and later calves are being dropped each succeeding year. In the control group, the third calf crop averaged approximately three months later in birth than in the phosphorus groups.

One pasture, fertilized with approximately 200 pounds of triple superphosphate per acre, is stocked approximately 50 percent greater than the other experimental pastures. Cows grazing this pasture have had a higher percentage calf crop and a heavier calf-weight weaned per cow than have any of the other groups. Vegetation in this fertilized pasture, after $4\frac{1}{2}$ years, continues to respond to this single phosphate application.

Corn Responds to Fertilization

The Station is running a fertilization test with corn and cotton grown on the same soil in alternate years. Objective of the experiment is to determine which combinations of nitrogen, phosphorus and potash fertilizers produce most satisfactory results in the College Station section.



Figure 9. Greater yields per acre with earlier maturity result from corn grown on soil (left) receiving a fertilizer with nitrogen, phosphorus and potash balanced in proportion to the soil's needs. Corn at the right is on unfertilized soil.

Figure 9 shows a comparison between corn growing on soil which had received 8-8-8 fertilizer at the rate of 500 pounds per acre (left) and corn grown on unfertilized soil.

Still better results, however, were realized from application of a 12-8-12 fertilizer (12 percent nitrogen-8 percent phosphorus-12 percent potash). Application also was at the rate of 500 pounds per acre.

Corn in these fertilized plats matured two weeks earlier than the corn grown on unfertilized soil. This earlier maturity in a dry year could mean the difference between making and losing a corn crop.

Cotton in this test responded to fertilization in about the same relationship as did corn.

Protein and Mineral Supplements for Hogs

All farm grains are deficient in protein. In order to produce rapid and economical gains with fattening pigs, a high quality protein supplement must be fed with the grain. The Station has obtained excellent results with the following protein supplement mixtures for fattening pigs:



Figure 10. Good type, vigorous, growthy pigs result, under proper management, from careful breeding, balanced rations and proper sanitation practices and disease control. Such pigs will use feed efficiently to weigh 200 pounds at six months. These 53 pigs from only six litters will be used by the Station to study problems relating to all phases of Texas swine production.

Number 1 Mixture

Soybean oil meal	80 pounds
Alfalfa leaf meal	10 pounds
Ground limestone	7 pounds
Salt	3 pounds

Number 2 Mixture

Cottonseed meal	40 pounds
Tankage or meat scraps	40 pounds
Alfalfa leaf meal	20 pounds

Number 3 Mixture

Meat scraps	90 pounds
Alfalfa leaf meal	10 pounds

Number 4 Mixture

Cottonseed meal	50 pounds
Tankage or meat scraps	50 pounds

The Number 4 mixture is for use when green pasture is available for the hogs. When green pasture is not available, better results are obtained when one of the first three supplements is used with the grain.

The Station has obtained good results with swine from a mineral mixture composed of 40 pounds of bone meal, 40 pounds of ground limestone or oyster shell flour, and 20 pounds of salt. Where the grain ration is ground and mixed with protein feeds before feeding, two pounds of this mineral mixture should be added to each 100 pounds of the feed mixture where vegetable protein feeds are used. The mineral mixture can also be self-fed in a mineral box with good results. It has been found to be good practice to keep a mineral mixture before the hogs at all times. The Station has also obtained good results with a simple mineral mixture composed of 80 pounds of ground limestone and 20 pounds of salt for swine.

Figure 10 shows the type of pigs raised by the Station.

Facilities Maintained for Testing Cotton

Fiber quality and spinning performance of samples of raw cotton can now be determined precisely as a result of the development through research of suitable equipment and technique for testing. Tests or measurements can be made of such physical properties of cotton fibers as tensile strength, fiber length, length variability, fineness and maturity. Tests are made on commercial textile ma-



Figure 11. Representative test samples of cotton are being manufactured into yarns under controlled laboratory conditions using commercial textile machinery. The processing behavior of the cotton is being observed and recorded. The quality of the manufactured yarns will be tested in the testing laboratory and the physical properties of the fibers in the sample will be measured in the fiber laboratory.

chinery to determine manufacturing waste, yarn strength, yarn appearance and general processing performance.

Testing facilities are provided at USDA laboratories in Washington, D. C., and Stoneville, Miss., which are equipped for fiber testing only, and at Clemson, S. C., and College Station. The Clemson laboratory is operated cooperatively with the Clemson Agricultural College, and the College Station laboratory, Figure 11, is operated cooperatively by the USDA and the Station.

Three types of testing were conducted during 1945: there was service testing for the public under the Cotton Service Testing Act of 1941; there was testing in connection with research programs conducted in cooperation with other federal and state research agencies, and there was testing in connection with standardization and research projects within the USDA, including the development of improved equipment and techniques for testing.

The volume of this work more than doubled during 1945. Service tests increased from 7,451 in 1944 to 11,696 in 1945; cooperative research tests increased from 6,297 to 9,182, and standardization and research tests increased from 2,505 to 12,252, a total increase during 1945 of from 16,253 to 33,130 tests. The volume of this work in 1946 is expected to exceed 1945 figures.

Hay and Grain Drying

Less than one-half the quantity of hay needed to adequately feed Texas livestock is produced in the State. The principal reason for this shortage is the production of such low quality hay that the product produced will not justify the use of the land and cost involved.

Under normal field-curing methods there is always a loss in the nutritional value of the hay. This reduction depends upon weather conditions and may be as high as 30 to 40 percent. Unfavorable weather also may cause the loss of the entire crop.

They hay drier, or as it is more appropriately called, the "hay finisher," is the answer to this problem as it provides a means for the farmer to get his hay into the barn with minimum exposure to the weather.

Considerable interest has also been shown in artificial drying of grain largely because of the use of the combine in areas where weather conditions are frequently unfavorable during the harvest season. Harvesting the grain before it is thoroughly ripe, rain during the harvest season, uneven ripening of the grain, green weed seeds and high atmospheric humidity, or a combination of these factors are responsible for the high moisture content of the grain as it comes from the combine. This moisture content is frequently too

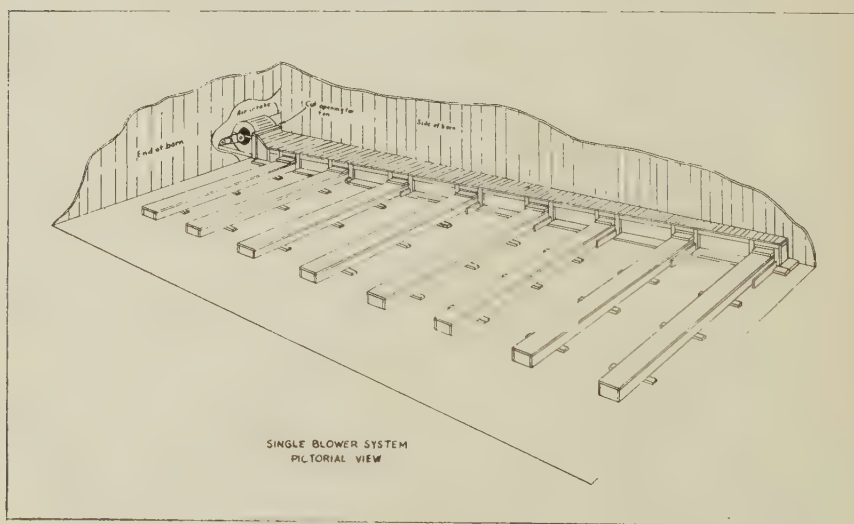
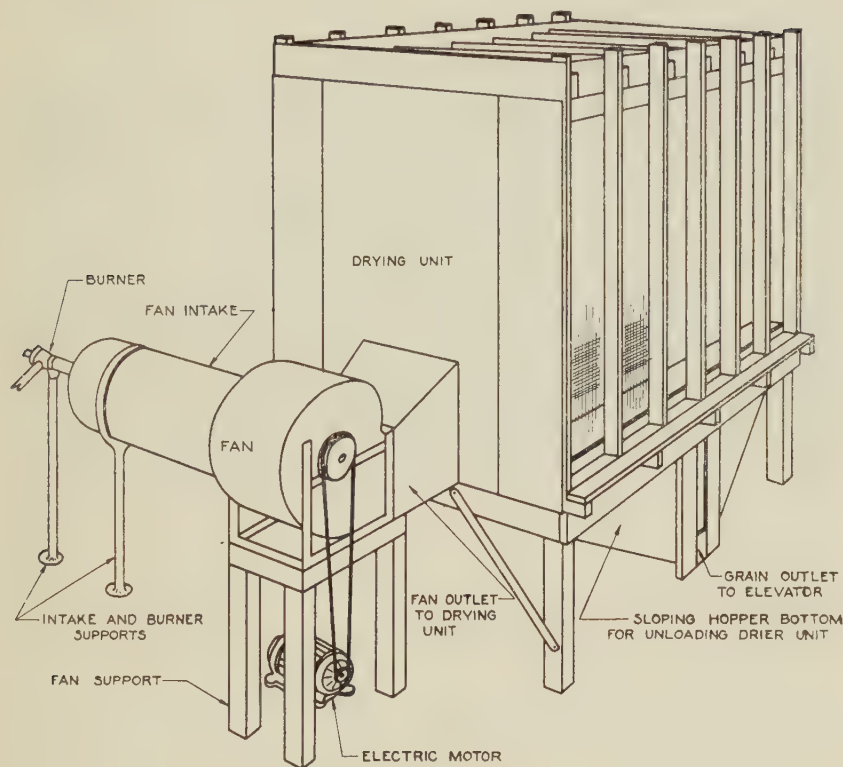


Figure 12. Pictorial view of single blower system hay finisher.



PERSPECTIVE FARM GRAIN DRIER

Figure 13

high for safe storage or for the grain to meet the requirements for the highest grade and, therefore, the highest cash price.

With these facts in mind, investigations were started in 1944 to develop practical equipment for hay and grain drying on Texas farms.

Briefly, the "hay finisher" consists of distributing partially cured hay (40 to 50 percent moisture content) over a system of air ducts. Air under pressure is blown through this duct system and up through the hay, thereby removing the moisture. A diagrammatic drawing of a typical farm hay finisher is shown in Figure 12.

Basic principle of the grain drying unit is the reduction of the moisture content of the grain by forcing heated air through the

grain placed in thin columns. A sketch of the experimental work is shown in Figure 13.

In all the experimental work in Texas the air was heated with natural or butane gas burners before it was forced through the hay and grain.

The cost of drying hay and grain will vary, depending upon the moisture content of the product at the beginning and at the end of the drying period, the cost of electricity, and the cost of fuel.

With electricity at $2\frac{1}{2}$ cents per KWH and butane at 8 cents per gallon, the following figures can be used in estimating the cost (fuel and power) of drying various types of hay and grain:

Alfalfa hay—from 80 to 10 percent moisture—\$6 to \$7 per ton.

Alfalfa hay—from 65 to 20 percent moisture—\$2 to \$2.50 per ton.

Sargo hay—from 65 to 20 percent moisture—\$2 to \$2.50 per ton.

Bundled hegari—from 65 to 20 percent moisture—\$2 to \$2.50 per ton.

Chopped hegari—from 75 to 10 percent moisture—\$2.50 to \$3.50 per ton.

Combined rice (in sacks)—from 20 to 13 percent moisture—60 cents per ton.

Combined grain sorghum (bulk or sacks)—from 20 to 13 percent moisture—50 to 55 cents per ton.

Peanuts, threshed (bulk or sacks)—from 15 to 7 percent moisture—25 to 35 cents per ton.

Establishing Buffalo Grass Pastures

Buffalo grass, Figure 14, is the most valuable native grass for permanent pastures on the high-lime soils of Central and North Texas. Its ability to withstand more constant and severe grazing than any other native grass makes it particularly valuable for medium to small-sized farm pastures.

Seeding and sodding experiments conducted in the past eight years at the Denton station, indicate that seeding is more satisfactory and less expensive than sodding. The land should be bedded on the contour as is usually done in preparation for cotton. Planting is best accomplished by using a corn planter and a corn plate which will seed approximately 5 pounds of seed per acre in 36- to 40-inch rows high on top of the lister beds, covering the seed only about one-half inch deep. This practice permits easy and accurate cultivation to prevent weed competition with the slow growing grass



Figure 14. Test of buffalo grass strains in an attempt to find one more prolific of seed and forage.

seedlings. Plantings should be made in the spring about corn planting time, using seed that have been treated to increase the percentage and rapidity of germination.

Cultivation during the first spring and summer is highly important as the seedlings cannot withstand much shading by weeds or tall grasses. Even with cultivation it may become necessary to graze off the weeds and tall grass in the buffalo grass rows on top of the beds.

On land too rough or eroded for planting in bedded rows, an ordinary grain drill may be used. In this event, tall weed and grass competition should be kept to a minimum by mowing or by grazing.

Studies in Rations for Chickens

Figure 15 shows the equipment that has been used by the Station to study the choline requirements of chicks, and the effect of pantothenic acid levels in hen rations on the pantothenic acid requirements of the chicks hatched from eggs from these hens. This equipment is also used for studies on the riboflavin requirements of chicks.

The addition of .05 percent choline chloride to rations containing no animal protein but containing soybean oil meal in amounts ranging from one-half to all of the protein concentrate caused the



Figure 15. Weighing and examining chickens to detect differences in various levels of choline and pantothenic acid.

chickens to make faster gains than when no choline chloride was fed.

The addition of .05 percent choline chloride to rations in which 4 percent sardine meal was fed with soybean oil meal caused the chicks to make faster gains than when no choline chloride was fed.

The use of .05 percent choline chloride gave as good results in these studies as did more of this material. When as much as 4 percent choline chloride was fed, the gains were unsatisfactory.

Studies indicate that the minimum dietary requirements of very young baby chicks for pantothenic acid may vary in accordance with the variations in the amount of pantothenic acid in the egg as affected by the amount of pantothenic acid in the diet of the hen.

These studies indicate that there is no advantage in doubling the recommended allowance of riboflavin in a ration for chicks regardless of the percentage of protein it contains.

In these experiments an excess of B-complex vitamins served in no apparent way to compensate for an absence of adequate amount of protein.

Legumes for North Texas

Hairy vetch and Austrian winter peas planted early in September or early October at the Denton station using a grain drill and seeding at the rate of 25 pounds of vetch and 40 pounds of Austrian peas per acre, gave about equal growth by April 1. After this time, Austrian winter peas usually become infected with mildew and growth is greatly retarded or completely killed. Hairy vetch is resistant to this disease and should be used whenever late plowing under is desired. Also hairy vetch will grow to maturity and make a fair seed crop while the Austrian winter peas rarely reach maturity and seldom make seed.

A very satisfactory and cheaper method of seeding hairy vetch and Austrian winter peas is to use a grain drill, with only the seed spouts open, that will plant a single row on each side of a cotton stalk row or on each side of a lister bed. This method requires only one-half the amount of seed as when all drills are open.

Tests at the Denton station to determine best methods and time of turning under indicate that the primary consideration should be the preparation of a good seed bed for the following crop. Usually from 30 to 60 days, depending on the rainfall, are required to get a good seed bed. The legume must be turned under when rather small, about March 15, if cotton is to follow. If a later crop like



Figure 16. Austrian winter peas (left) and hairy vetch (right) in the full bloom stage, May 15.

grain sorghum or Sudan is to follow more time for growth of the legume can be given and better results obtained. Turning under the legume with a plow and then planting the next crop flat has given a better seed bed and thus better results than when bedding under with a lister and planting the next crop in the usual manner. If hairy vetch is permitted to grow to maximum height or full bloom stage before turning under, about May 15, still better results are obtained; Figure 16. Equally as good results are obtained if the vetch is permitted to mature, usually about June 15. This is not too late to plant a grain sorghum crop. Allowing vetch to mature some seed before turning under insures a volunteer crop the following fall. Also vetch usually makes a fair seed crop that can easily be harvested direct with a combine and pickup attachment, if the vines and seed are fully mature and dry.

Crop Improvement by Soil Fumigation

Tests conducted in the Lower Rio Grande Valley have demonstrated for some crops the feasibility of soil fumigation for the control of nematodes and other plant pests. In a field heavily infested with nematodes, D-D mixture used as a fumigant well before planting increased the yield of cabbage about 250 percent, Figure 17. The same material vastly improved appearance, vigor of growth, and flower production in snapdragons, Figure 18. In a large



Figure 17. Showing improvement in cabbage yield on nematode-infested land due to soil fumigation with D-D mixture. The baskets show the relative yields on treated and non-treated soils.



Figure 18. Showing improvement in snapdragon growth and flower production due to soil fumigation.

gladiolus flower and bulb producing plantation, blocks several acres in extent are fumigated before planting time. Newly developed machines have made this operation relatively simple and speedy. Nurserymen are using the method for ridding the nursery soils of nematodes and injurious soil fungi.

Wool Scouring Plant Activities

Wool samples totaling 225,000 pounds which were graded and scoured during 1945 in the Wool Scouring Plant, Figure 19, operated by the Station, represented the largest volume handled during the plant's 25 years of operation, and was an increase in volume of over 400 percent in the 1944 total.

Objectives of the plant are to conduct research on grades and shrinkages of Texas wool with the goal of improving the overall quality of the Texas wool clip; to afford producers, warehousemen and buyers an opportunity for obtaining definite information on wool shrinkages, and for Texas A. & M. College agricultural students to use the plant in connection with wool studies.

As a result of studies of clean wool yields made by the wool scouring plant, Texas wools are now accepted by the wool trade at a much higher clean basis. This means a substantial saving to Texas wool growers.

A good deal of research was done during 1945 on wool sampling

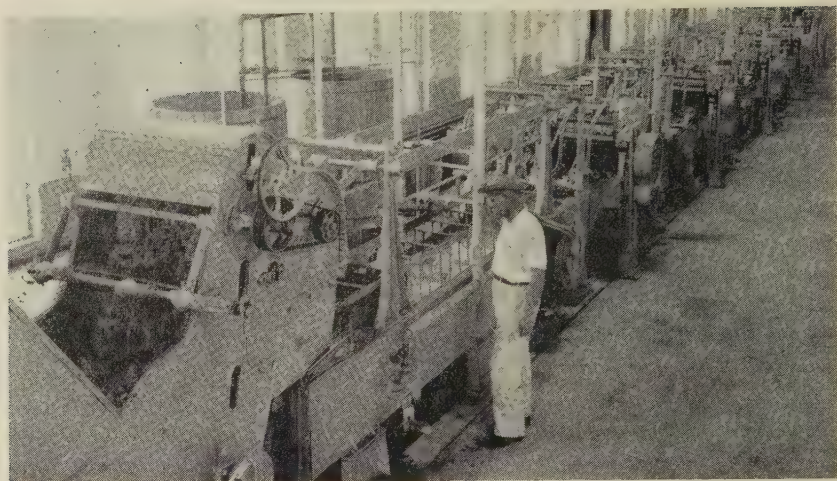


Figure 19. General view of Texas A&M College Wool Scouring Plant where each fleece gets individual attention.

in warehouses. The plant now has a method which enables the taking of a core sample from a lot of wool in storage that will assure a representative sample for shrinkage determination. This sampling method, though the most accurate so far devised, has need for refinement. The plant is continuing its research in an attempt to simplify the procedure.

Vitamin C in Cabbage

Cabbage is the leading commercial vegetable crop in Texas both in acreage and money value. It is one of the most popular leafy vegetables among rural families of the State. Raw cabbage is one of the best sources of vitamin C. That used in this experiment, averaged 45 mg. per 100 grams, or in one serving (75 grams) enough to furnish about one-half of the recommended daily allowance of vitamin C for an adult. Vitamin C is easily destroyed by heat, but the results of cooking tests reported here, Figures 20 and 21, show that cabbage may be cooked so as to retain three-fourths of its vitamin C in palatable and attractive products.

The cabbage cooked in the three proportions of water, as shown in Figure 20, was all excellent in appearance and eating quality, but that in test C when cooked contained twice as much vitamin C as in tests A and B. One serving (one-half cup cooked) of the cabbage from test C would furnish one-third of the recommended



Figure 20. Volume of water (indicated by height of paper strips in cylinders) and quantity of fresh raw cabbage (four servings on each plate) were used in the three cooking tests indicated by A, B, and C.

daily allowance of vitamin C; cabbage from either test A or B would furnish only one-sixth of the allowance. However, the liquor in both tests A and B contained as much vitamin C as the cooked cabbage. Hence, if the liquor as well as the cooked cabbage is consumed, the two products together will furnish as much vitamin C

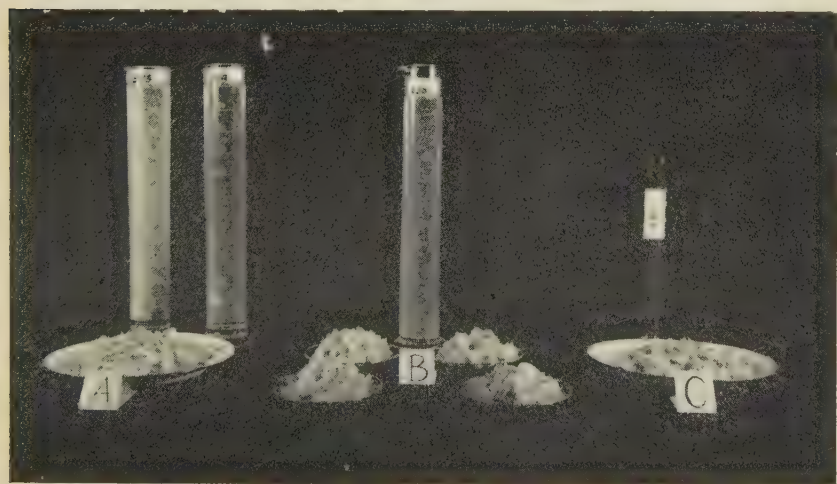


Figure 21. Volume of liquor and same cabbage as in Figure 20, after cooking. The four servings (one-half cup each) are shown separately in B.

as the cabbage cooked in the smallest amount of water. The little, if any, liquor left from the smallest amount of water would be eaten with the cooked cabbage.

In each test, enough raw chopped cabbage for four servings (two-thirds pound) was cooked until tender but still firm enough for the pieces to hold their shape. A large proportion of water ($5\frac{1}{2}$ cups) was used in test A; half as much ($2\frac{3}{4}$ cups), or just enough to cover the cabbage well, in test B; and not quite one-half cup in test C. Slightly more of the natural white and green color, but less of the flavor was retained when the two larger proportions of water were used. Most judges preferred the more pronounced flavor of the cabbage cooked with the least water. All things considered, cooking as in test C is the choice of the three methods used.

Seasonal Use of Range Grasses

The procedure of purchasing feeder steer calves in the fall, wintering them either on wheat and sorghum bundles or on native grass with cottonseed cake, then grazing them during the summer on test pastures to determine the seasonal value of native and reseeded cool season grasses has continued through its third year at the Amarillo station.

Results secured indicate that cool season grasses, such as western wheat grass and crested wheat grass, must be used as available while



Figure 22. Yearling steers, 1944 calves, at the Amarillo station, part wintered 1944-45 on grass and the rest on wheat, and wintered 1945-46 on wheat and ground sorghum bundles. Average weight Nov. 9, 1944 was 380 pounds, and Dec. 1, 1945 was 1,023 pounds.

the warm season native grasses, buffalo and blue grama, or Sudan, must supply the feed for midsummer. Excellent gains from wheat pasturage, Figure 22, emphasize the importance of wheat and cool season grasses in a scheme for year-round grazing.

Potatoes Immune to Late Blight

One of the most difficult problems in the production of Irish potatoes in the Lower Rio Grande Valley is the control of late blight. Control of this disease by sprays and dust is not very successful due largely to the long period of time potatoes are present in the growing area. Sebago, a white-skinned potato of high yielding ability, has been chosen as the most satisfactory answer to the late blight problem at this time, Figure 23. Pontiac, a red-skinned variety of considerable merit, has also been under test. This variety, while not having the blight resistance of the Sebago, does have considerably more vigor and is less subject to wind burn than Bliss Triumph. Lack of sufficient seed has contributed to the small acreage of Pontiac now planted.

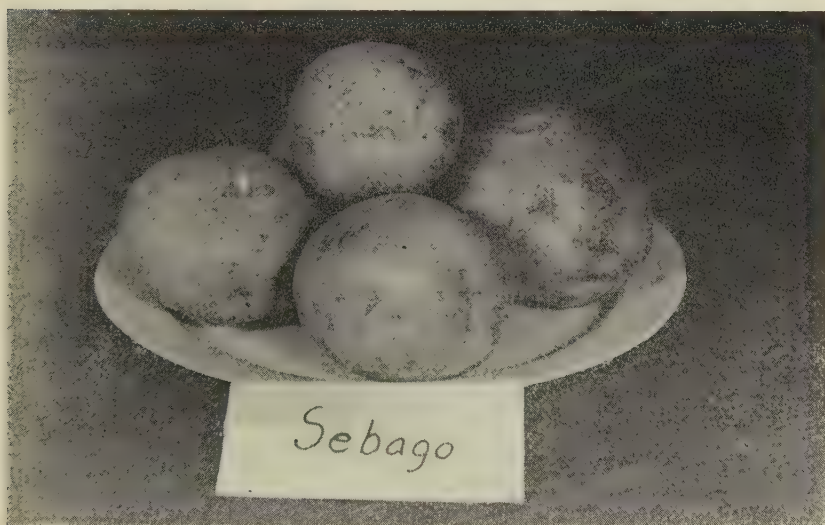


Figure 23. The white-skinned Sebago Irish potato is high yielding and is resistant to late blight.

Greenbug Resistance of Small Grains

Breeding work is now under way at the Denton station in an attempt to develop adapted varieties of small grain which will be resistant to greenbug attack. During the severe infestation and destruction of the 1942 crop of small grain, several Chinese barleys grown at Denton were resistant to greenbug attack, Figure 24. Crosses have been made between these Chinese barleys and varieties adapted to Texas conditions with the hope of producing adapted resistant varieties.



Figure 24. Showing the high resistance of two Chinese barley varieties when all other varieties in adjoining plats were completely killed by greenbugs.

Control of Onion Thrips With DDT

Lack of an effective insecticide against onion thrips has presented commercial onion producers in the Winter Garden district with the hazard of losing considerable annual tonnage and often entire crops.

During the 1945 season further studies included a comparison of concentrations up to 3 percent DDT, special attention being given to possible plant injury. DDT at this concentration proved to be the most effective in reducing the numbers of both adults and nymphs and made possible significant increases in yields over untreated check plots, Figure 25.

The average seasonal per plant thrip infestation on untreated onions during 1945 was 121 with a per acre bushel yield of 226. With DDT dusting, as the strength of the insecticide increased the number of thrips decreased and the per acre yield advanced. At 3 percent DDT, the seasonal average of thrips per plant was 40 and a yield of 284 bushels of onions per acre was secured.

Although the most efficient diluent has not been selected and much is to be learned about timing of applications, DDT dusts do fill the requirement for an effective thripicide that is well suited to application by airplane.



Figure 25. Getting a count on thrip infestation on onion plants which, on account of the cloth screen, were not reached by the insecticide dusted from an airplane.

Soil Building Practices

In addition to research conducted at College Station and on outlying substations and field laboratories, the Station conducts large scale experimental programs under actual field and pasture conditions on farms and ranches of the State in cooperation with the owners.

Portrayal of an example of this cooperative program is shown in



Figure 26. Winter legumes, planted in two-row strips between two rows of corn, being turned under to improve the soil. Next year, corn will be planted in these strips and winter legumes will be planted in the space now devoted to two rows of corn.

Figure 26. It is an example of research generally aimed toward control of cotton root rot.

Growing two rows of corn with one row of summer legume in the next row for soil improvement has been a fairly common practice for some time, and is still used in some parts of Texas. The modification of this practice shown to make use of two-row tractor equipment in the blacklands has been called the "two by two" method. Two-row strips of a green manure crop, either a summer or winter legume, or both, are alternated with two rows of corn in a two-year rotation. This picture shows a mixture of Austrian winter peas and *Melilotus indica*, an annual yellow-blossom sweetclover, in the strips between each two rows of seedling corn. To the left, the strips have been turned under. The legumes may be seen in front of the tractor equipped with a home-built integral mounted disk tillage attachment, and in the strips to the right. This type of corn-legume rotation, or corn-fallow rotation, is popular along the western edge of the blacklands where corn usually lacks adequate moisture in early summer. This system also is an economical method for controlling Johnson grass without interruption of cropping schedules and with a minimum of hoeing.

This 200-acre field usually makes 30 bushels of corn per acre under this system with only half the rows planted.

Wintex and Texan Barleys Recommended

Wintex and Texan are new barley varieties that are adding to the farm income in Texas. Wintex barley, Figure 27, is now grown



Figure 27. Visitors at the Denton station inspecting a field of Wintex barley for sale to growers as foundation seed.

extensively and its acreage is spreading as rapidly as seed becomes available. Over a ten-year period of testing at the Denton station, it has produced an average yield of 6 bushels per acre more than Tennessee Winter which was formerly grown more extensively. Texan barley, recommended for Central Texas, is resistant to mildew. Its smooth awns eliminates the damage often done to the mouths of livestock by the rough, heavily barbed awns of all other varieties now available in the State.

Green Pasturage for Hogs

Green pasturage is one of the basic essentials for efficient and profitable swine production. Studies at the Station show that one acre of good oats pasture will save as much as 600 pounds of protein supplement and 800 pounds of grain in a 90-day fattening period where 55-pound feeder pigs are fed to a final weight of 200 pounds, Figure 28.

With a good growing season, green Sudan grass pasture will produce a saving of 300 to 500 pounds of protein and from 200 to 400 pounds of grain per acre for fattening pigs fed from 50 pounds to market weights of 200 pounds. Sudan grass pasturage gives better results for hogs when it is young and tender and around 15 inches high. If Sudan grass gets waist high, it should be mowed, or more livestock should be used to graze it back to where it is used as a hog pasture.

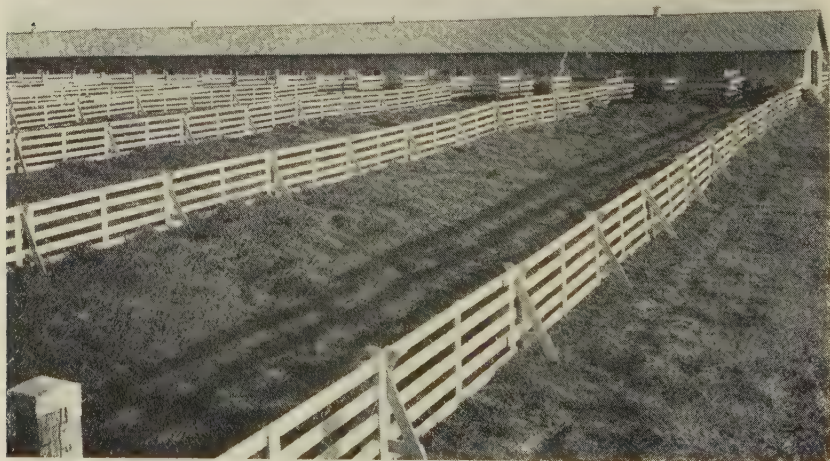


Figure 28. Experimental pasture equipment where individual pasture lots are used for determining the value of pasturage in swine production.

One-Hundred-Bushel Yields of Corn

Thick stands of well adapted hybrid corns on fertile irrigated land on the Weslaco station produced yields of shelled (cleaned) grain above the 100-bushel per acre mark. Stands near the 20,000-plant per acre mark gave the best results in 1945. Irrigation during the tassel stage and through the hard dough stage is also a highly important factor in corn production in the Lower Rio Grande Valley.

Open Face Ewes Are Good Breeders

Analyses of 2,513 records of wool covering on faces of registered Rambouillet ewes at the Sonora station during 18 years show that open, or bare-face ewes are more consistent breeders than those which carry either a medium or heavy covering of wool on the face.

Figure 29 is a graphic illustration of the influence of wool covering on the face upon lambing percentage for each of the ages from 2 to 8. It is observed for each age that lambing percentage for the open-face ewes was far greater than that for the ewes with covered faces. Lambing percentages for ewes showing a medium covering

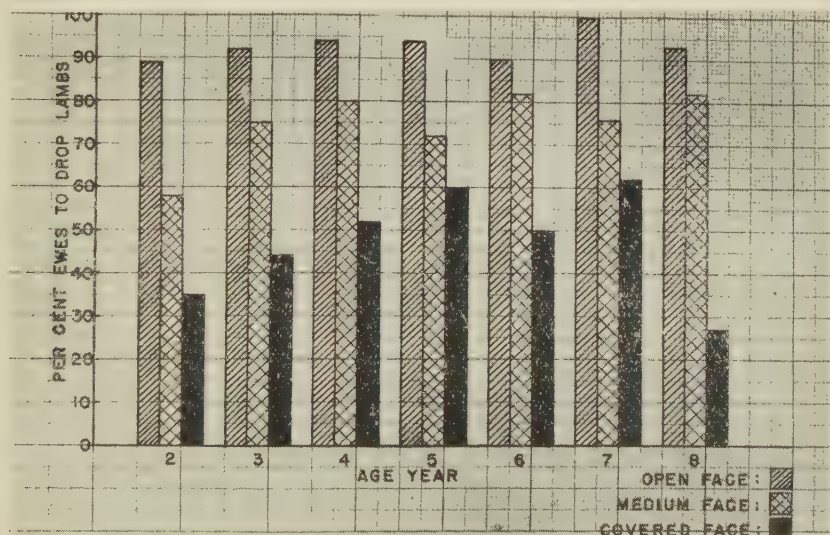


Figure 29. Influence of wool covering on face upon lambing percentages.

of wool on the face were midway between the two extremes, open and covered.

Ninety-four out of each 100 four-year-old ewes with open faces dropped lambs, as compared with 52 out of each 100 ewes of the same age but classified as covered face. In this four-year-old age group 80 of each 100 ewes with a medium covering of wool dropped lambs.

Lambing percentage trends for the open, medium and covered faces for each of the respective ages through the seventh year, are shown to be quite consistent with the performances emphasized for the fourth year.

Wool-covered faces are consistently objected to by Texas range breeders. It would seem desirable, therefore, to follow a definite breeding program that would result in a strain of range sheep with open faces. Until such a goal has been finally reached, however, wool should be systematically clipped several times a year from around the eyes of sheep carrying a heavy face covering of wool.

Better Oats Strain in Prospect

A yet unnamed strain from the cross of Fulwin x Lee-Victoria oats gives promise of adding an important new oat variety to fill



Figure 30. Fulwin oats (left) destroyed by crown (leaf) rust of oats while a hardy selection from the cross Fulwin x Lee-Victoria produced more than 50 bushels per acre in adjoining plat. This new strain combines the hardiness of Fulwin with the rust resistance of Victoria.

Figure 31. A plat of the new rust and smut resistant Austin wheat at left compared with a rust susceptible variety broken down by the disease at right. Over 1,000,000 acres of Austin wheat were planted in Texas during 1945-46 season.



Figure 33. Hairy vetch, a soil building legume, planted on ridges.



Figure 32. A method used for obtaining large numbers of the overwintering stages (hibernacula) of the pecan nut case-bearer in order to test oils and DDT-oil emulsions for control of this pest. Recent experiments indicate that DDT is the most promising insecticide that has been tried. It was used in winter at concentrations of approximately .25 and .50 percent and in spring at concentrations of 1.6 and 3.2 percent DDT in water.

an urgent need for a very hardy rust-resistant oat. This new strain, from two seasons tests by the Station, appears to be as hardy as its Fulwin parent, one of the most winterhardy oats known, and considerable more hardy than the red rustproof oats commonly grown. This new strain is resistant to leaf rusts of oats and produced a high yield in 1945 when the Fulwin, rust susceptible variety, was seriously damaged by rust, Figure 30. Even in seasons when rust was not a factor in yield, it has produced yields equal or superior to the best varieties now available.

Vitamin A Requirements of Beef Cattle

The Spur station fed five lots of ten Hereford yearling steers each and two lots of five Jersey yearling steers each in the 1945-46 study of vitamin A requirements of beef cattle. One lot of Hereford steers and one lot of Jersey steers were fed cottonseed hulls as the roughage in the dry lot fattening period of 112 days. The same combination of lots received six pounds of ground alfalfa hay daily per head and sumac silage as the roughage. One lot of Hereford steers had sumac silage, Figure 34, another hegari silage, and one had access to wheat pasturage and cottonseed hulls.

There was no significant difference between the two breeds in respect to either carotene or vitamin A in livers or fats. The lot



Figure 34. One of five lots of steers used by the Spur station in the study of sorghum roughages as sources of carotene in the rations for fattening steers. This lot received chopped sumac bundles as the roughage in this test.

given alfalfa and sumac silage showed significantly higher values only for carotene in both fat and liver than the lot fed cottonseed hulls. The differences between the lots fed cottonseed hulls, sumac silage and hegari silage were not significant. Steers from wheat pasturage showed much higher values for carotene and vitamin A than the other lots.

The fat of steers from wheat pasturage was yellow. The fat of all Hereford steers fed in dry lot was white to pinkish white. There was more yellow color in the fat of the Jersey steers than for the Hereford steers which were similarly fed, however, one Jersey steer, the only one in the test which became night blind, showed very white fat. Carotene intake is apparently a controlling factor in the storage of carotene in the fat and affects the color of beef fat. Most of the yellow color in beef fat seems to be caused by carotene. Since carotene is necessary to good diets, it appears that grade distinctions based on yellow color alone are not justified.

Citrus Size Aided by Thinning

Because of the marked tendency for fruit size to decrease on trees after they become older, considerable interest has been aroused in the possibility of thinning fruit in an effort to control size. Recent

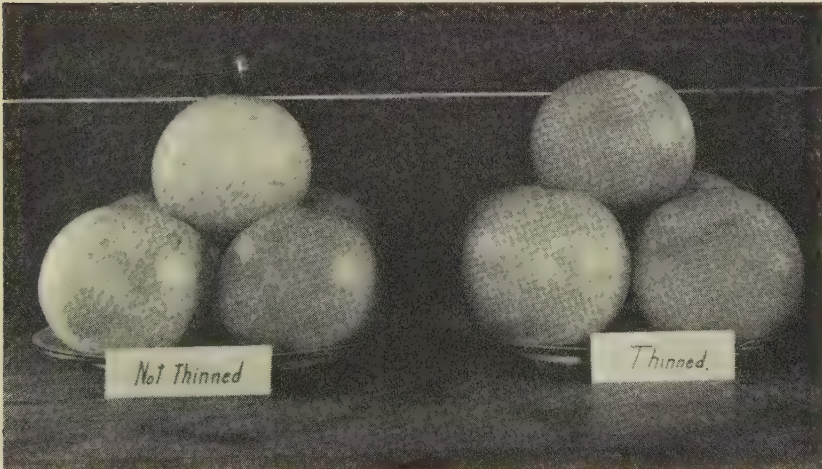


Figure 35. Showing the difference between grapefruit taken from trees thinned with wax sprays and not thinned. The bright line in the back is set level so that the added height due to size of the fruit shown is apparent. The larger fruits extend over the rim of the plate, whereas, the smaller fruits are all well within the rim. Actually, the thinned fruits are approximately two sizes larger than the fruits not thinned.

literature indicates that the use of wax sprays in the thinning of deciduous fruits is quite satisfactory. A preliminary experiment was set up at the Weslaco station in the spring of 1945, using Do-wax as the thinning agent for grapefruit. This material proved highly effective, Figure 35. There was also a marked increase of the size of the fruit remaining on the trees following this treatment as compared with that on untreated trees. The results were so successful that the tests will be made on a larger scale during the coming year.

Phosphate Fertilization of Coastal Ranges

Open yearling heifers pastured from March, 1945 to January, 1946 on a pasture that had been fertilized with the equivalent of 500 pounds of 20 percent superphosphate, and the pasture seeded and disked, Figure 36, averaged more than 200 pounds per head heavier than control heifers on native bluestem pasturage. When the same amount of superphosphate was applied to bluestem cover on the same soil, Lake Charles clay, the predominant soil type of the Angleton section, the heifers were only 100 pounds heavier than the controls. There has not been time to determine how long applications of phosphate will last on the various soil, or whether it



Figure 36. To determine the best methods for improving pastures in the Gulf Coast area, 280 acres of typical prairie land on the Angleton station were fenced off into seven 40-acre pastures. Each was given separate treatment. These heifers gave the best response from a pasture that had been plowed, disked, leveled, drained, and fertilized with 500 pounds of 20 percent superphosphate mixed with the soil at disking time. They gained 203 pounds per head more than the control group.

is profitable to apply superphosphate to the range. Studies on methods and rates of application also have not matured. However, work on the soil at Angleton indicates that much less superphosphate is required to raise the pasturage to an adequate level of phosphorus content on disked and plowed land than is required on sod.

Disease-Resistant Tomatoes

Breeding of tomatoes for resistance to plant diseases is carried on by the Station at the tomato disease laboratories at Jacksonville and Yoakum, Figure 37. Resistance to some important diseases is

found in certain small-fruited tomatoes of South American origin. These species have been utilized in the development of strains that withstand wilt and others that may prove resistant to nematode root knot. The testing of various strains of tomatoes for resistance to southern blight is also in progress.



Figure 37. The tomato plant (*Lycopersicon esculentum*) on the left is badly infested with root knot, while the plant (*L. peruvianum*) on the right has none of these nematode galls on the roots. Both seedlings were transplanted into the same plat of infested soil about three weeks before the picture was taken. Hybrids of these two species are being tested for root-knot resistance.

Control of Decay in Citrus Fruits

The efficiency of decay control by certain standard chemical treatments has been increased by certain follow-up procedures. The use of sodium hypochlorite at .75 percent in the final wash before drying, waxing, and packing, not only reduced still further the amount of blue mold but brightened the fruit as well. The use of diphenyl-impregnated tissue for fruit wraps also proved beneficial in increasing the control of decay.



Figure

Upper left—Individual tree harvest records are kept in the peach adaptability test. The fruit is then examined for size, shape and quality. Early varieties are packed in four-bush crates at the Nacogdoches station, as shown, for local sale. The better new early yellow varieties include Burbank, July Elberta, Halsehaver, Newday, Sunhigh, Truogem, Viceroy, Vedette and Viceroy.

Center—Flax grown in twin rows on the tops of beds separated by water furrows has proved to be a good practice under irrigation in the Lower Rio Grande Valley, or on poorly drained soils of the Coastal Prairie. One or more cultivators with power machinery are usually required to control weeds and keep the water furrows open to give surface drainage.

Upper right—New varieties of peaches are changing the entire peach variety situation in Texas. This is a tree of Radiance in fruit on the Nacogdoches station. This is a white freestone of good size, shape and production. Its excellent color permits it to compete successfully with the new early yellow varieties.

Lower left—Field view of typical stalk characteristics of Texas Hybrid corn. Notice the large ears and two to each stalk, also uniformity of growth, height and full development.



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of the ears. Hybrids adapted to Texas conditions have been available only a few years. In addition to hybrids developed by the Texas Agricultural Experiment Station, several hybrids developed by commercial firms have been handled in experiments. Most hybrids included in 1945 corn variety tests gave higher yields than open-pollinated varieties. The corn shown is Texas Hybrid No. 8, a yellow corn which has given satisfactory yields in the blacklands for several years.

Lower right—The point contact method for determining the vegetative composition of an area. Here a count is being recorded of grasses and legumes growing in a pasture fertilization experiment conducted on the Beaumont station. One end of the frame is placed on the ground, while the other end is tilted about 45 degrees. Notice the wires, or "pins" two inches apart. Plants touched by each pin from the ground to the crossbar are recorded, giving ten readings in the area covered by the frame. At least ten such tabulations, or 100 readings, are listed at a time. These readings are repeated at intervals to get listings of all vegetation varying in seasonal appearance and density.



Figure 43. Second-year Madrid sweet clover drilled, in full bloom, left. First-year growth alone and in spring oats, center. Second-year Madrid in 36-inch rows, right.

Madrid Sweetclover Showing Merit

Madrid sweetclover, a new biennial yellow-flowered type, is superior in leafiness and cold resistance to the common white biennial and the common yellow biennial sweetclovers. In tests on the Denton station since 1927 Madrid has proved more satisfactory than any other variety of sweetclover for grazing, hay production, seed production and soil building, Figure 43. When planted alone in the early spring in the blacklands of Central and North Texas, the first season's growth has yielded 1 to 1½ tons of excellent quality hay, or furnished considerable grazing from about June 15 to late November. The second season's growth has yielded 1½ to 2 tons of hay by very early bloom stage (May 10-15) and the subsequent stubble growth yielded from 100-150 pounds of seed. If the second season's growth is not cut for hay, or pastured later than April 15, the seed yield should be from 300 to 500 pounds. At present seed values Madrid sweetclover is a valuable cash crop and should be planted alone.

Overseeding Madrid sweetclover in fall grain is rarely successful due to shading and competition for moisture by the grain soon after the clover is planted. On the other hand, seeding the clover immediately after planting spring oats (January or early February) is usually successful because both clover and oats get an equal start.

Effect of Trash in Cotton

To determine the effect of the removal of all trash on the grade, staple and price, 60 samples of ginned cottons were classed, cleaned and again classed by the Station.

Cleaning raised the grade from 2 to 6 grades, an average of 4.2 grades, but had no significant effect on the staple. The waste removed ranged from 3.7 to 32.8 percent, an average of 9.1 percent. Differences in price of 500 pounds of uncleaned cotton and the same cotton cleaned ranged from a loss of \$13.88 to a gain of \$24.02, a difference of \$37.90, but with an average gain of \$7.11 for the 60 cottons.

Individual cottons showed startling differences. For example, the two samples of cotton, shown in Figure 44, were given the same grade and staple, therefore, they brought the same price per bale uncleaned, although sample A contained 36 pounds of trash and sample B contained 164 pounds in the 500-pound bale. Both were raised 5 grades by cleaning. Had only the cotton in each of the original 500 pounds been sold, there would have been a gain of

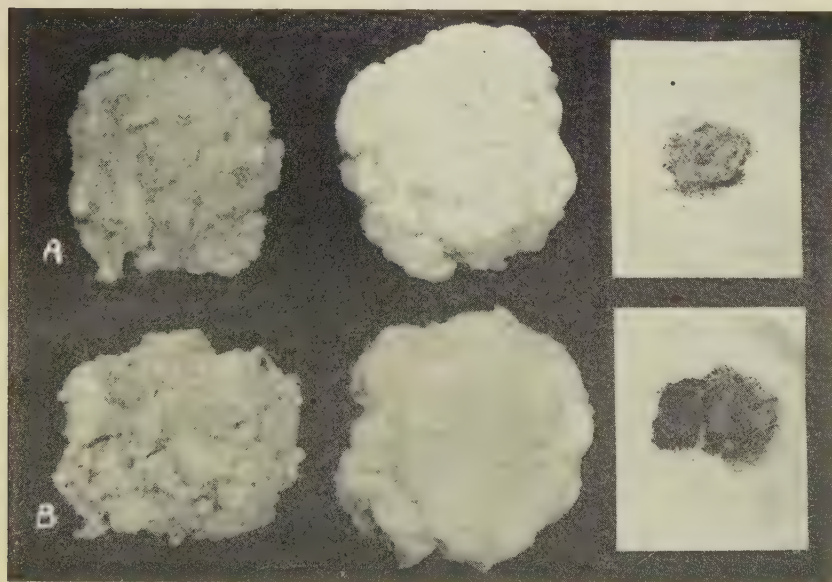


Figure 44. Showing the effect of cleaning ginned cotton. Before cleaning the grade, staple and price were the same for the two samples. Removal of 7 percent waste from sample A raised the price per bale \$13.59, and removal of 31 percent waste from sample B lowered the price \$13.88 per bale, a difference of \$27.47 per bale.

\$13.59 in the cleaner, and a loss of \$13.88 in the dirtier cotton, a difference of \$27.47 per bale.

From the study of these 60 cottons it appears that either efforts should be made to develop commercial size equipment to clean cotton at the gin, or the percentage of waste by weight should be determined and given due consideration when the cotton is sold. The quantity of clean cotton within the bale would then be known, there would be fewer bales with resultant savings on transportation and handling, and the producer would sell and the mill would buy a product of higher quality. These changes would necessitate adjustments in our present grading and pricing system, changes which even now appear to be needed and the necessity for which will become greater as mechanical harvesting increases.

Pecans With Companion Evergreens

Twenty years of experimenting with pecan trees at the Iowa Park station have revealed that pecans in the Wichita irrigated valley do very poorly in buffalo grass or Bermuda sod, much better when given clean cultivation, but best of all when planted with or near evergreens, particularly conifers.

In 1926 some pecan trees were set along the west line of the farmstead. Most of these died soon after setting and the few that survived did not grow satisfactorily. Later, a general farmstead improvement program called for Arizona cypress along this line. In 1933, when these pecan trees were seven years old, they had made little growth and were in such poor condition that it was decided to ignore them and set the cypress on equal spacings. Some of the cypress trees were placed very near pecan trees while others were farther away. None of the pecans was removed, however.

As the cypress trees grew, the pecan trees near them began to take on new life, while the isolated pecan trees continued in their unthrifty state. As the years passed the pecans with companion cypress trees continued to increase in health and vigor until there was no doubt about the favorable influence of this companionship. At the time the cypress trees were set close to the older pecans, other pecan trees were being set in various locations on the farmstead; some in open sod and others with or near evergreens of various types. The behavior of these trees also confirms the value of companion evergreens for pecans in the Wichita irrigated valley.

At the age of seven years the pecan trees in Figures 45 and 46 were about the same size and in equally poor condition. The treat-



Figures 45-46. Left—A pecan tree which at the age of 20 years has a height of only 8 1/2 feet and trunk diameter (21 inches above ground line) of 3 inches. The cypress, set out when the pecan was 7 years old, was placed 14 1/2 feet north of the pecan tree. The new one-year-old shoots on the pecan tree now indicate that perhaps the companion cypress is beginning to have some influence. Right—A pecan tree which at the age of 20 years has a height of 28 feet and a trunk diameter of 13 inches. The cypress tree, set out when the pecan was 7 years old, was placed only 4 feet north of the pecan tree. Note the spread of the cypress which shades the ground for several feet around the pecan. Relative heights of these trees are shown by the height of the man in each picture.

ment as far as cultivation and irrigation is concerned has been the same. Hence, the great contrast in size of the pecan trees is attributed to the favorable influence of the companion conifers.

Field Tests With Rhodes Grass

Field plantings of the cold-resistant Rhodes grass by the Station have shown that this strain is capable of producing heavy yields of hay. An experimental area on which individual plants were spaced 3 feet apart in 3-foot rows produced 3,937 pounds of high quality baled hay per acre in one cutting. It would have been possible to secure two additional cuttings but other experiments with the plants



Figure 47. This pasture, consisting mostly of needle grass and worthless weeds, was plowed, fertilized, and seeded in three-foot rows to Rhodes grass. Compare with Figure 48.

made this impossible. On a near-by pasture which was carpeted with needle grass and a few worthless weeds, it was possible, by breaking the land, adding fertilizer, and planting seed at the rate of about 2 pounds per acre in 3-foot rows, to establish a pasture ready to graze in seven weeks. This pasture was cut four times during the year and produced 11,428 pounds of air-dry hay per acre.



Figure 48. The pasture shown in Figure 47 as it looked seven weeks after planting to Rhodes grass.

Hubam Clover for Soil Building

The increasing popularity of hubam clover is readily understood considering some research developments at the Temple station. A few years ago this plant was an unproved soil-building crop in the blackland. Today it is by far the best soil building and soil conserving plant tried for that area. In addition to these qualities it is a good forage plant, good seed producer, and reduces root-rot damage to cotton, thereby increasing cotton yields.

At first cattle are reluctant to eat hubam but when a taste is acquired for this slightly bitter clover, cattle relish it. Hereford steers grazing hubam clover after small grain in 1945 gained 1.77 pounds per head per day over a 56-day period, Figure 49.

Oats and some other small grain crops are erosion resistant and are surpassed in this capacity only by permanent meadow or sod grasses. Oats and hubam grow well together, thus giving an excellent soil building and soil conserving plant mixture for the blacklands. This combination has increased the yield of oats 6.9 bushels per acre the second year over oats without a soil building crop. In addition, 125 pounds of clover seed were harvested after the oat crop. Hubam is still green and growing profusely when the oats are ready for combining. The green material makes it difficult to combine oats directly. Under this condition the crop may be cut with a binder and bundled or windrowed, Figure 50. It has been



Figure 49. Hereford steers grazing hubam clover growing on Houston black clay soil. These steers gained 1.77 pounds per head per day over a 56-day period.



Figure 50. Windrowing oats and hubam with a grain binder. Curing the oats and green clover in windrows for a few days is necessary before an efficient job of threshing with a combine can be done.

found that curing of oats and green clover in windrows for a few days permits the farmer, with the aid of a pick-up attachment on his combine, to combine his grain, Figure 51, and leave the all-important plant residues on the soil rather than putting them in a hay stack.



Figure 51. Threshing oats from a windrow with a pick-up attachment on the combine. Oat straw and hubam clover residue is spread back on the land.



Figure 52. Root-rot disease of cotton controlled by two-year rotation of hubam clover and cotton. The plot on the left is cotton following a seed crop of hubam clover the preceding year. The plot on the right is continuous cotton.

Hubam clover in rotation with cotton reduces the damage from root rot and increases cotton yield. Best results have been from two-year rotations with the cotton following a seed crop of hubam clover, Figure 52. Substantial increases in yield of lint and corresponding decreases in root rot also have resulted with cotton following a winter cover crop of hubam, even though the amount of winter cover turned under was small. Another annual clover, the yellow blossomed *Melilotus indica*, has been tested in comparison with hubam, but the white-flowered hubam is more winter hardy and makes better growth in this region.

The effect of hubam in rotation with cotton is to delay the root-rot disease and allow maturity of the cotton before the fungous disease kills the plants. Results for 1945 are typical for a year when root-rot damage is severe.

Practical Pruning and Training of Grapes

Growers usually use one of three methods of pruning and training grapes in Texas; namely, Kniffin, Figure 53, Munson, Figure 54, and a form of renewal, Figure 55. The latter method is confined primarily to North Texas and is termed the modified renewal for convenience in comparison.

Trellis construction is the same for the Kniffin and the modified



Figure 53. Carman vines pruned and trained to the single-trunk Kniffin system.

Figure 54. Carman vines pruned and trained to the Munson system.



Figure 55. Carman vines pruned and trained to the modified renewal system.

renewal methods. For the Munson, an additional wire, arm braces and bolts are required which increases the materials cost by about \$40 per acre. Due to this additional expense and also because yields have not been as high as by the Kniffin, the Munson system is not as desirable for commercial production.

In experiments conducted during the past six years at the Montague laboratory, the Kniffin method of pruning has proven to be the most profitable system. Yields have been 6 and 18 per cent greater from this system than from the Munson and modified renewal, respectively. This difference has amounted to approximately \$20 an acre per year in favor of the Kniffin over the modified renewal based on prices received during the past three seasons. Vines are easier to prune when trained according to the Kniffin system and the clusters are more conveniently located for harvesting. No system seems to have any effect on the time of maturity as based on the sugar content (Brix reading).

In this test, all vines have been pruned to four canes with an average of twelve buds each. In addition, four short renewal spurs, two buds in length, have been left, making a total of 56 fruiting buds per vine.

Weed Control in Canals

The control of weeds, vines, grass and brush that infest the thousands of miles of irrigation canals in the Lower Rio Grande



Figure 56. Herbicidal chemicals such as dinitro-amyl-phenol, in diesel oil, offer promise for use along canal banks. Grasses, vines and weeds check the flow of irrigation water and also pollute the water with their seeds. Compare with Figure 57.



Figure 57. Sprayed portion of same canal bank as shown in Figure 56.

Valley is a problem of importance to all water district managers and to all farmers who use water from the Rio Grande. Experiments conducted by the Weslaco station show that vine and weed control can be obtained for a period of about six months with sprays containing ammonium sulfamate (Ammate) and dichloro-phenoxy-acetic-acid (2,4-D), Figures 56 and 57. The cost would range around \$15 per acre or about \$30 per mile of canal. Two spray treatments a year would be required. This treatment is not effective on most grasses, nor on retama, tepehuaje and tule.

Dinitro ortho cresol in diesel oil is highly effective on grass, weeds, vines and most brush. This Station-developed method is being used commercially.

Lambs Fattened on Alfalfa Hay

Two hundred fifty-five Rambouillet feeder lambs fed 119 days at the Ysleta station were fattened satisfactorily on alfalfa hay with limited amounts of concentrates. First and fourth cutting alfalfa hay had the same approximate value. There was no indication of benefit from the supply of bone meal as a lick. Gains were about as good for 43 percent protein cottonseed cake as a supplement to alfalfa as an equal amount of milo, but milo fed lambs were higher in carcass grade. Except for a possible saving in labor, there was no apparent advantage in the deferred feeding of grain even in a long feeding period.

Summer Steer Grazing Experiments

Summer grazing experiments with yearling steers have been underway at the Spur station for four years. Seventy percent of the seasonal gains have been realized before August 1, with the greatest gains being made in May. In 1945, steers on heavily grazed pastures, Figure 58, gained only 61 pounds per head as compared with a gain of 151 pounds for steers on pastures less heavily grazed, and 225 pounds for steers on pastures where there was a relative abundance of summer feed, Figure 59. Steers on cleared pastures (two years) have averaged about 14 percent more gain per steer and per acre than steers on mesquite brush pastures. Calves wintered well, as on wheat with access to native pasture and later summered well as yearlings in 1945, made 218 pounds more gain per head than calves wintered only fairly well and summered on heavily grazed pastures.

The difference between good and poor treatments preliminary to fall and winter dry-lot fattening as yearlings is equivalent to about 100 days of feeding. In farm steer beef production, good treatments prior to dry-lot finishing are obviously profitable.

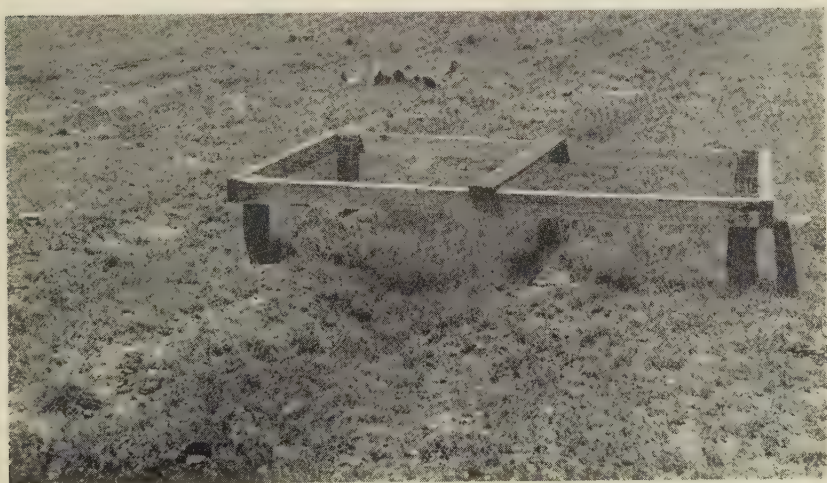


Figure 58. A companion pasture to the one shown in Figure 59, which has been heavily grazed for four years. The protecting cage was placed over patches of buffalo and tobosa grasses before the pasture was grazed during the 1945 season. Notice the scant, sparse vegetation outside the cage. Even under the cage there was not as much grass as in the open on lightly stocked pastures. This was due to heavy grazing during the three preceding years.



Figure 59. Steers on a pasture at the Spur station that has been grazed lightly for four years. Notice the amount of grass cover (in comparison with the coverage in Figure 58, heavily grazed) and the condition of the two steers shown.

Controlling Citrus Gummosis

Progress has been made at the Weslaco station in studies on the cause of citrus tree gummosis, which is probably the most serious



Figures 60-61. Left—A grapefruit tree dying from a bad case of gummosis induced by a parasitic organism in the wood. Right—Good (B and C) and poor (A, D, and E) pruning wound treatments. B and C are probably safe from infection until the wounds heal over. A, D and E are likely to result in a severe case of gummosis in the branches and trunk.

tree disease occurring in that section. An unidentified actinomyces-like organism has been found permeating the discolored bands of wood underlying the gumming bark. Inoculations into healthy wood with wood tissue from the advancing edge of the discolored bands have consistently reproduced the disease. Progress has been made on control by pruning off badly affected branches, by excavating affected wood and treating the exposed healthy wood with a penetrating disinfectant and by preventing new infections by avoiding the wounding of the bark and by treating all pruning wounds. See Figures 60 and 61.

Yellow Beard Grass Does Well

In trials at the Denton station, yellow beard grass has spread rapidly from volunteer seed; made a dense cover in two years from 36-inch row seedings; withstood intense grazing over a longer period than other similar grasses such as little bluestem; has survived in good condition winter temperatures as low as 5° F as well as severe drouth conditions in the summer; has produced good quality hay about equal to little bluestem and has been more productive of seed and more easily established from seedlings than other similar type grasses, Figure 62. It will probably be several years yet before a sufficient number of plantings are established to provide seed for general use.



Figure 62. Second-year growth of yellow beard grass in 36-inch cultivated rows.

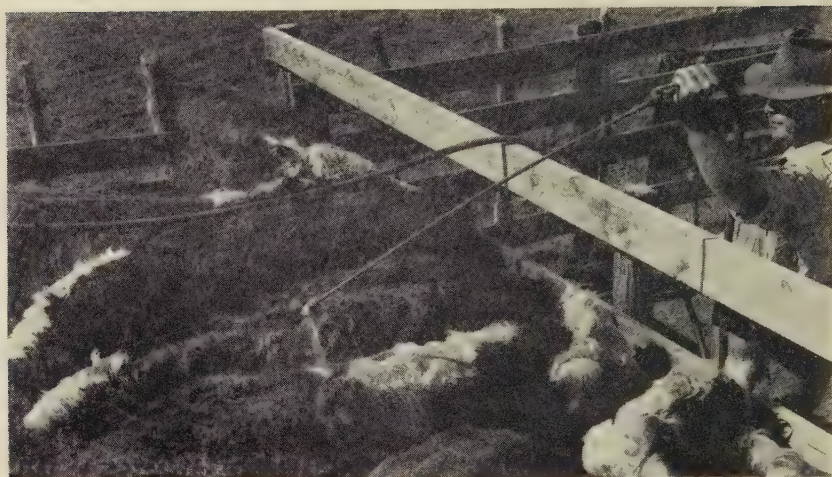


Figure 63. Spraying steers with water dispersible forms of DDT to control the hornfly. One treatment gives good protection for a period of 14 to 20 days under pasture conditions.

DDT Controls Hornflies on Livestock

Successful control of hornflies on range livestock has been made possible with water dispersible forms of DDT. This organic insecticide, unlike other fly killing chemicals, remains highly toxic for considerable time after only one treatment. During periods of heavy fly populations, steers carrying as many as 1,500 flies were fly-free within one hour after treatment and remained practically free for 14 to 20 days.

Steers at the Spur station were treated by placing them in a long chute and thoroughly wetting their entire bodies with a power sprayer, Figure 63. The amount of solution used varied from one-half to three-fourths gallon per head when treating 600- to 800-pound steers.

Not all the steers need to be treated to kill hornflies on livestock in a pasture. Treating one-half the steers in a pasture gave good control of hornflies on all steers. More recent studies indicate that spray or dust applications containing DDT when applied to heads, shoulders and backs may give equally as good control of hornflies as treating the entire body. Studies are under way to determine whether control of the hornfly on range livestock will become an economic practice.



Figure 64. Above, four cotton plants of the Stoneville 2B variety grown in the greenhouse under the following variations in light conditions, left to right: Check; black-cloth shade for 4 days soon after first bolls were set; heavy shade daily from 3 p.m. to 9 a.m. (short day); and close spacing. Note the poor set of fruit on the three treated plants as compared with the check. Below, the Deltapine 14 cotton plant (on right) set a much heavier load of bolls under winter greenhouse conditions than the Lone Star plant (on left). Both varieties fruited well in the summer out-of-doors, under similar cultural conditions.

Water dispersible forms containing 25 to 50 percent DDT were used in these studies. One pound of 50 percent DDT or 2 pounds 25 percent DDT powder dispersed in 50 gallons of water has proven equally as effective in killing hornflies over a 30-day period as stronger solutions. There have been no indications of harmful effects either to the animals or to the men making the spray applications.

Until more information is developed oil solutions of DDT should not be used to treat steers or other animals since DDT is soluble in oil and in this state may enter the pores of the skin and cause injury to the animal.

Fruiting and Shedding in Cotton

During the past few years, the Station has been actively engaged in the study of the effects of light on cotton fruiting, especially in regard to the shedding problem. It has been found that certain variations in the amount of sunlight available to the cotton plant, such as occur with cloudy weather, periods of short days, artificial shading, or even the close spacing of plants in separate containers, are frequently associated with decreases in fruiting and increased rates of shedding, Figure 64. Certain varieties of upland cotton were found less sensitive than others to these unfavorable light conditions.

Effects of Thinning Cotton Bolls

Limiting the number of bolls to two per plant in an experiment by the Station, resulted in an increase of 13 percent in weight of seed per boll and a 4 percent increase in weight of lint. Fiber length and fineness were not changed but the fibers were 5 percent stronger and the yarns 6.7 percent stronger than those from many-boll plants. The partially defruited plants were twice as large as the normal ones. Bolls affected by drouth opened 2 days earlier than those on plants in irrigated plots and the weight of seed cotton per boll was reduced by 10 percent; the length of lint was reduced by a little and the strength of yarns by 6 percent. Cotton picked from plants that had been killed prematurely by root rot had the same fiber length as that from live plants; it was also 12 percent finer and less mature. The strength of the yarns, however, was not changed by the death of the plants, although there were more neps and increased waste in the dead-plant fibers.

B-Vitamins in Stewed Beef

Stewing is the basic cooking process not only for stews but for many meat dishes which have more glamorous names. Retention of nutritive value after cooking by such a universal method deserves investigation.

The physical conditions of stewing vary considerably in different sections of the United States. Light stews are preferred in some places and brown stews in others. In certain sections of the country, enough water is used to cover the meat completely and is served separately. In others, only the smallest amount of water is used and it is served with the meat. Such marked prejudice was found in regard to the proper method of stewing that investigation of all of these variations by the Station seemed the only practical thing to do, Figure 65. Temperature variables had to be included also. A "simmering" temperature has long been recommended for stewing, though practically it has been difficult to keep stews below the boiling point for the 2 or 3 hours needed to get them tender. The re-



Figure 65. Stewing in pressure saucepan. The mineral oil manometer was devised so that the same temperature for searing could be reproduced in successive cooking tests.

cently introduced pressure saucepan has made possible short cooking periods and pressured stews have become important.

Experiments were designed to show which of these variables are important in causing losses of thiamine, riboflavin, pantothenic acid and niacin in beef stews. Only the results of thiamine are now available. Thiamine is sensitive to heat and all methods of stewing cause some loss, but the searing for brown stews causes greater losses than any of the other variables. Brown stews, however, are regarded by some as so definitely superior in flavor and appearance to light stews that these factors outweigh the lower thiamine content as long as sufficient thiamine is available from other foods.

Cantaloupes for Lower Rio Grande Valley

After many years of discouragement due to the ravages of insects and diseases, there has been a revival of interest in cantaloupe culture in the Lower Rio Grande Valley. This has been due largely to the introduction of the variety Texas Resistant No. 1, developed at the Winter Haven station. New cantaloupe strains developed at the Weslaco station are offering still more promise. Two completely different lines, both however, with Smith's Perfect as the source of high quality and flavor, are promising, Figure 66. One strain, with mildew resistance derived from an Indian variety, has good fruit type, high yields, and good disease resistance. Another year or two of selection is necessary before the new strains can be released commercially.



Figure 66. The product of a single hill of a cantaloupe strain in the third generation from the original cross between a selected strain of Improved Smith's Perfect and a variety from India with high resistance to downy mildew. Note the good center set of the melons and the uniformly good melon type.

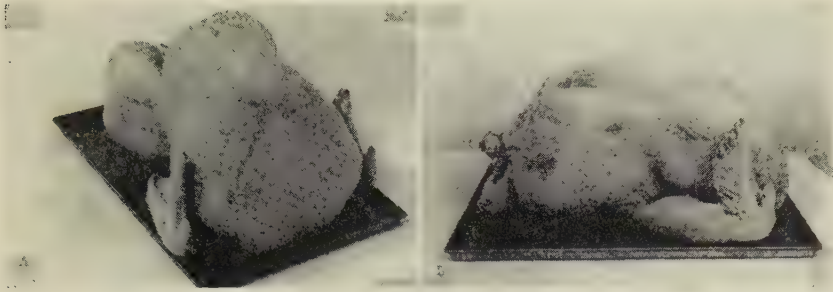


Figure 67. Good type broad breasted turkey. Front view, left, and side view, right.

Selection of Turkey Breeding Stock

The Station has shown that careful selection of turkey breeding stock is necessary to produce individuals with a body type similar to the bird shown in pictures A and B of Figure 67. This bird has the desirable breeding and market qualities of a broad breasted turkey. These good qualities are:

Broad breast; uniform in width from the front point to the rear



Figure 68. Turkey breast types. Good type of breast is shown in A, upper left. Breast line and back line are parallel. Keel extends well back between the thighs and is free from prominence at the point. Undesirable breast types are shown in B-1, B-2 and B-3, the three other pictures. B-1 is an angular bird. The breast is slightly deep in front and shows some prominence at the keel point. A cross section at the breast should have a "V" appearance. B-2 also is an angular bird. Notice the prominent knob at the point of the keel. B-3 has a rocker type breast showing a curved breast bone.

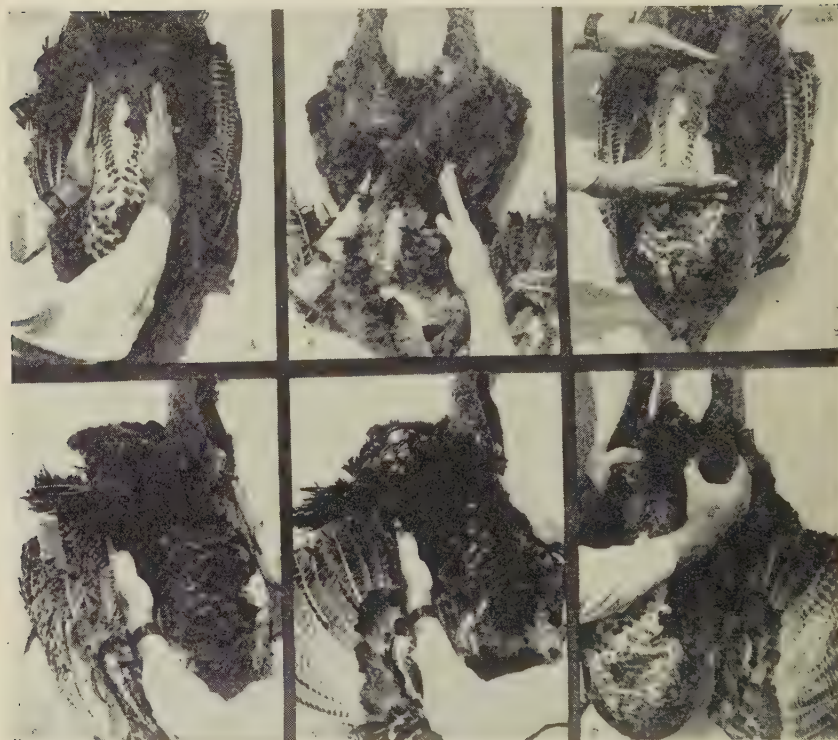


Figure 69. Body handling steps. Top row, left to right: A. Uniform width of breast throughout its length. Desirable type. B. Angular breast, pinched body, heavy front. Undesirable type. C. Long keel, extending back between thighs gives balanced tom. Desirable type. Bottom row, left to right: D. Uniform depth of body, back and front lines parallel. Desirable type. E. Angular bird, deep in front making an unbalanced tom. Undesirable type. F. Well meated thighs and legs. Desirable type.

point of the breast bone (keel). This uniformity of width should extend from the back down over the keel so that a cross-section of the breast should approach the shape of the letter U rather than V, see picture A.

Breast line parallel to back line, picture B.

Body free from a pinched appearance in front of the thighs.

Straight, refined keel, lacking in prominence and well-covered with flesh.

Heavy fleshing of thighs and legs. Legs should be plump and meated well toward hocks.

Good width of back and breast.

The Station has found that in the final selection for good type

breeding stock, many breast types are encountered. Figure 68 shows one good type and three undesirable types.

Research work in turkey breeding has shown that nearly all important characteristics are to some degree inherited. It has also shown that the essentials for success in turkey improvement are rigid selection, accurate record keeping, systematic mating, good feeding and careful management.

Selection of the breeding stock should begin at an early age and continue throughout the season. Such a program will permit the segregation of early maturing birds. Final selection should embrace a plan of perusing the records, observations of the birds while walking and body handling. The latter will necessitate the suspension of the turkey and precaution should be taken to prevent leg injuries. Do not suspend turkeys by the legs for a very long period of time when not otherwise supported. Keep their legs separated a distance similar to the width of the leg attachment to the body. In walking turkeys, watch for leg weaknesses, difficulties in gait, type discrepancies and balance deformities.

Figure 69 depicts the steps in handling birds so that desirable qualities can be determined, established and maintained in the turkey breeding flock.

Superior Cottons Yield Well

Staple cottons grown at the Weslaco station, compare favorably in spinning quality with those from any part of the United States. Varieties such as Coker 200, Coker 100, Stoneville 2B and Deltapine, yielded well over two bales per acre. Super-strong types, such as Wilds 16, produced average yields about the one and one-half bale mark in 1945.

Stand and irrigation are the two most important factors affecting yield in the Lower Rio Grande Valley.

Sorghums Yield Heavy Under Irrigation

Most of the standard grain sorghums produce abundant yields when grown on irrigated Lower Rio Grande Valley land. Many carloads of grain sorghums were shipped from the Valley in 1945. The Weslaco station is cooperating in the development of new varieties for South Texas which are resistant to foliage diseases. Sweet Sudan and a number of the Shallu hybrids show marked resistance to disease. Some of the hybrid sweet sorghum and several of the standard varieties produced forage yields above the 25-ton per acre mark in 1945.

Developing Young Bulls in Sire Groups

Young Hereford bulls, winter fed in cooperation with breeders are used by the Balmorhea station to determine if certain adjuncts to available farm feeds in the Trans-Pecos area are beneficial to growth and gain, Figures 70 and 71. Progeny development tests with the same animals are conducted both as a service to the cooperating ranchmen and to assist them in the breeding of cattle that have outstanding ability to gain and produce beef of high quality.

The 130 young bulls started on test in 1945 were from 6 ranches and were bred by 14 herd sires. They were divided into 6 lots with an equal distribution of progeny. The basal ground mixed ration, which was self fed, consisted of approximately 75 percent hegarri fodder, 13 percent alfalfa hay and 12 percent cottonseed meal. This ration fed for a number of years has produced 2½ pounds daily gain in 100- to 120-day feeding periods. The addition of one-half pound of bone meal did not increase the rate of gain in the 1945 tests.

This work has strong support from Trans-Pecos ranchmen and has attracted attention over the State. The Balmorhea station has developed a self feeder, also a method of feeding and rations suitable to the job of winter feeding bull calves for good and economical development.

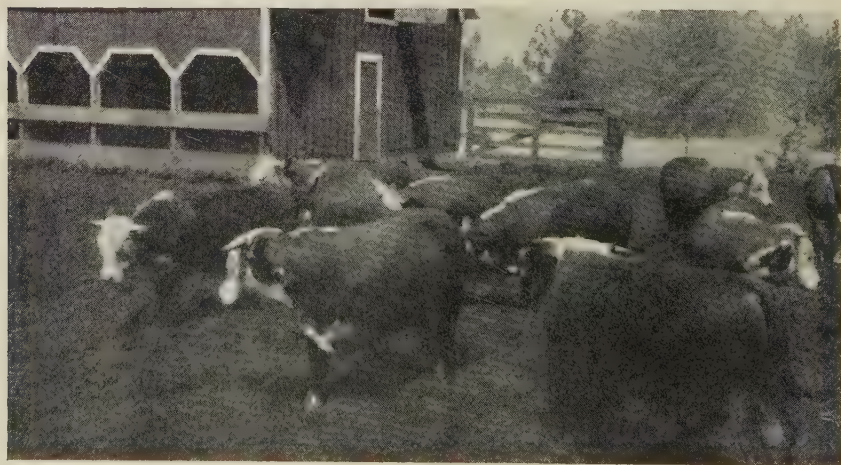


Figure 70. Some of the 15 yearling past Hereford bulls fed by the Balmorhea station for the JEFF Ranch in an experiment on development and testing of young bulls in sire groups. These bulls were sired by Shelby Domino, one of the ranch herd sires, and considered one of the best bulls in the Davis Mountains. This ranch near Fort Davis, is owned by the Mrs. Lee K. McCutcheon Estate, and is managed by J. H. Killough of La Grange.



Figure 71. This pile represents the total amount of feed eaten by each of the 130 bulls carried 123 days in the progeny development tests at Balmorhea. The smaller sack in the left foreground contains 61 pounds of bone meal fed to only one of the six lots of bulls. In the background are 1,761 pounds of hegari bundles, next are 6 bales, or 413 pounds of alfalfa hay. The center bottom sign is on a sack containing 2 pounds of salt, and around it are 3 sacks, or 308 pounds of cottonseed meal.

Nitrogen Important in Citrus Production

An example of the rapidity with which good fertilizer practices can bring back into production a partly run down citrus orchard was found by the Weslaco station in a fertilizer experiment in Cameron county. In 1944, the first year the experimental program was put into effect, the total yield from a Marsh orchard, the experimental plot containing 48 trees, was only 104 field boxes per acre, each containing 80 pounds of fruit. The total yield in 1945 from these trees was 164 boxes, an increase of 64 percent. Treatments in this case were all based on the use of 5 pounds of ammonium nitrate per tree.

Defoliation an Aid in Harvesting Cotton

The use of 35 to 40 pounds of calcium cyanamid defoliant as a dust application about ten days prior to picking, did not reduce yields or the quality of Weslaco station cotton but did materially shorten the picking season. This is quite important in the Lower Rio Grande Valley, where all cotton stalks must be plowed under by August 31.



Figure 72. *Fultex* oats growing in variety test plats alongside its rust susceptible *Fulghum* parent in a season when leaf rust was a serious factor in yield. Note the *Fulghum* parent (at right) broken down and lodged because of rust damage. *Fultex* (left) had a yield of 78 bushels per acre in this plat when the adjoining plat made a yield of four bushels per acre.

Fultex Oats Meeting With Favor

Fultex oats, developed at the Denton station, is meeting with favor and becoming widely grown in the State. Its resistance to crown (leaf) rust and smut, combined with its early maturity, enables it to produce satisfactory crops in many seasons when older susceptible varieties are damaged by rust or hot weather near maturity, Figure 72. Its strong straw permits combine harvesting directly from the field. It is being grown extensively in the southern part of the Rolling Plains, where combines are used almost exclusively.

Roughages in Steer Fattening Rations

In a test of various roughages at the Spur station, the addition of 6 pounds of alfalfa hay daily per head to a ration of sumac silage, cottonseed meal and grain resulted in a saving of cottonseed meal and an increase in gain and finish. Steers fed sumac silage as the roughage made more gain and cheaper gain than steers fed cottonseed hulls, chopped sumac fodder or Martin milo silage. This and other tests at Spur have failed to show any merit for using grain sorghums for silage instead of sweet sorghums.



Figure 73. Hog wallow in connection with feed pens. This is a good arrangement of feeding pens for fattening hogs where shade, concrete hog wallow, concrete feeding floors and alfalfa hay racks are provided. Self feeders are under the shed. A concrete water trough is also provided.

Concrete Hog Wallows Pay

Fattening hogs will make faster gains when they have access to a sanitary concrete hog wallow during periods of hot weather, according to Station tests, Figure 73. Sixty-pound pigs with access to a concrete hog wallow will reach a market weight of 200 pounds in two weeks less time than pigs fed without access to the wallow.

Home Grown Feed for Fattening Lambs

Lamb feeding tests conducted at the Iowa Park station in 1933, 1939 and 1940 demonstrated the adequacy of home-grown feeds for fattening lambs. With the results of these tests as a guide, surplus feeding stuffs, including grain sorghum heads, oats, grain sorghum forage, alfalfa hay and cottonseed meal, are being utilized in feeding station-bred Rambouillet lambs for the spring market.

The present project includes 24 lambs, 17 of which were dropped during November. These lambs have been creep-fed since they were large enough to begin eating a ration consisting of one-third whole oats and two-thirds ground feed mix made up of equal parts of oats, whole corn and grain sorghum heads (80 percent) and cottonseed meal (20 percent). In addition, they have had access to good alfalfa hay and ground hegari forage for roughage. Due to lack



Figure 74. A lot of creep-fed lambs which at 100 days from birth weighed an average of 70 pounds.

of winter pasture the lambs have been restricted to dry lot throughout the entire period.

The average weight of these lambs at 100 days from birth was 70 pounds, with the top lamb weighing 82 pounds, Figure 74.

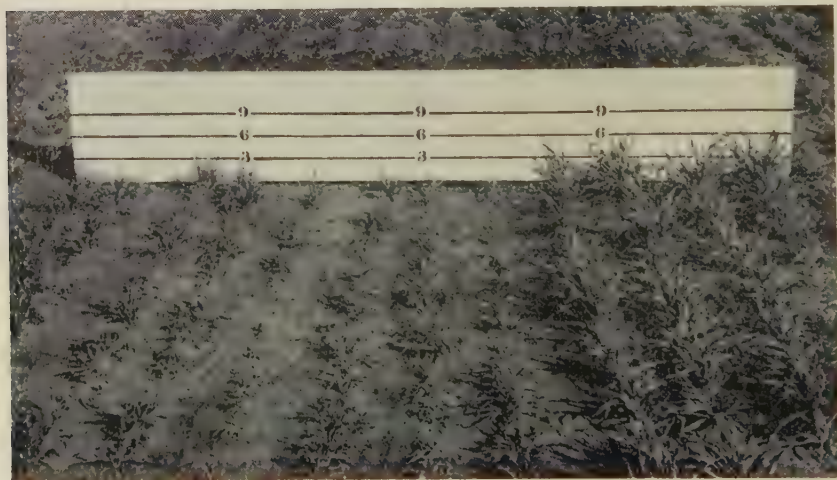


Figure 75. The center four rows of rescue grass produced 220 pounds of seed per acre while the four rows of the improved strain on the right produced 1,169 pounds of seed.

Improved Rescue Grass

Rescue grass, which is a valuable late winter and spring annual, has been growing in the State for at least 100 years. Stockmen have long recognized its value for winter grazing, at it reseeds readily when once established, even though heavily grazed. In the past a great deal of seed was imported from Australia, but in the last few years some stockmen and farmers have been planting rescue grass for seed production, while others have been harvesting seed from natural sources such as roadways, parks, and waste places.

Work was started in 1941 by the Station to ascertain if strains could be selected which would not only produce an abundance of seed but also would be heavy forage producers. By 1944, 6 strains were available, the best of which produced 1,169 pounds of seed and 2,165 pounds of air-dry forage per acre, while the poorest produced only 220 pounds of seed and 1,353 pounds of air-dry forage per acre, Figure 75.

Cotton Insect Investigations



Figure 76. Thrips damage in cotton is characterized by the presence of curled or crumpled small leaves which appear wind-torn when grown. When injury is severe, the terminal bud may be killed as shown above.

Reducing the damage done to cotton by insects is highly important in making a profit, Figures 76, 77, 78 and 79. New insecticides provide considerable promise for obtaining more economical control of insects attacking cotton, and if early control proves practical, the problem of reducing the cost of cotton production will be greatly simplified.

Tests by the Station in 1945 involving DDT indicate for the first time that insecticides are being developed which give promise of controlling thrips on cotton. DDT is not effective against boll weevils.

A 2.5 percent DDT-sulphur



Figure 77. Under favorable conditions for growth of cotton, it is profitable to protect the late crop from weevils. After this cotton had set about one-third bale per acre and then had been severely damaged by bollworms, 9 applications of calcium arsenate yielded 190 pounds of lint per acre. These applications were made by airplane at a total cost of \$8.37 per acre, giving a net profit of \$37.23 per acre.

combination reduced the number of aphids by 50 percent, while these insects increased four to five and one-half times respectively



Figure 78. Pink Bollworm investigations at Brownsville and Fabens include a determination of the time and percentage of survival in spring when the overwintering stages are subjected to different conditions. This scene is at the Brownsville laboratory. Pictured is an experiment involving buried bolls, bolls on the soil surface and bolls on standing stalks.



Figure 79. Part of experimental cotton plats showing result of boll weevil and boll-worm control. Cotton on right received 9 effective applications of calcium arsenate at the average rate of 8 pounds per acre. The dusted plats yielded an average of 1,260 pounds of seed cotton per acre as compared with 639 pounds on the untreated plats, a gain of 621 pounds per acre.

on plats where DDT alone was used and where a DDT-oil dust was applied.

The work on thrips and aphid control is still in the experimental stage.

Cotton flea hoppers have caused more damage when the peak of hatching occurs during May than when it occurs in early March or April.

DDT in both spray and dust forms reduced the numbers of pink bollworms. It was shown that early applications limited the seasonal build-up of the pink bollworm population.

The earliest and most satisfactory fall destruction of cotton stalks that has been undertaken as a control measure for the pink bollworm in Texas was accomplished September 1, 1945 by means of State and Federal regulations. This procedure prevented fall increase of pink bollworms and at the same time cut off the food supply of the boll weevil.

Also, it was shown that mortality of pink bollworm larvæ in free cocoons was much higher than mortality in open bolls. Carryover of larvæ in open bolls remaining on standing stalks until spring was higher than in bolls that were buried. Fall burial increased larval mortality over spring burial of material on the soil surface.

Announcing Research Findings

Research findings are announced by the Station through many channels. Data are given formally to the press and public through printed bulletins and circulars, and shorter mimeographed releases called progress reports. Research workers are frequent contributors to the pages of technical journals, general agricultural magazines and the newspapers. Farmers and ranchmen are encouraged to visit the substations and laboratories to see and have experiments under way explained to them. Many of the outlying stations hold annual field days at which a general summation of the work the station features is given. Each talk usually is followed by a question and answer period. These field days are invaluable, barring all other considerations, in getting across to near-by operators the fact that the station cannot function properly without their good will, co-operation and constructive criticism. Though open field days were curtailed during the war years, smaller, selective meetings were held. Figure 80 shows a gathering of ranch owners hearing research reports given at the Sonora station.



Figure 80

Sheep in the Blacklands

Adoption of a definite soil conservation program in the Blacklands calls for the raising of large acreages of feed crops and the establishment of permanent pastures. Considerable interest has been shown in the Temple station's use of sheep for raising lambs, for



Figure 81

keeping pastures free from weeds, and for marketing excess feed-stuffs, Figure 81.

Requirements of sheep in the Blacklands are early breeding, fall lambing, abundant milking, good mutton conformation, heavy fleece, and the absence of horns and skin-folds. The Temple station is raising three-fourth Dorset x one-fourth Rambouillet sheep to produce a flock that will have these desired characteristics.

Weeding Row Crops With Selective Sprays

The hand weeding of closely spaced crops such as carrots, parsley and dill, is a major item of expense in producing vegetables. Tests and demonstrations conducted by the Weslaco station have shown that the more common fall weeds such as amaranthus, winter nettles, portulaca and most grass can be controlled when they are young (under 6 inches tall) by spraying the field with stove oil (tractor fuel) at the rate of 50 gallons per acre, applied at 75-100-pounds pressure with nozzles which throw a fan-shaped spray. This oil spray is not effective against false ragweed, sow thistle, sunflower and boerhaavia. Gasoline and cleaning naphtha were not as effective herbicides as the stove oil.



Figure 82. Front entrance of the Animal Disease Laboratory located on the Sonora station. It is operated primarily for investigations of causes and control measures for diseases of sheep and goats. For ten years, the laboratory has prepared an annual average of 1,500,000 doses of soremouth vaccine for sheep, which is sold at a fraction above cost to Texas sheep owners. This vaccine was first developed by the Station's Division of Veterinary Science.



Figure 83. A new pest of grasses in the United States, Rhodes grass scale (*Antonina graminis* Maskell.) It is abundant in Jim Wells, Kleberg and Nueces counties and is distributed in ten counties from Cameron and Hidalgo to Bee county and attacking 17 different host plants, but especially Rhodes grass. The soft shelled, white scales, enlarged about four times in the above picture, are found at the crowns occasionally at the nodes, and just below the surface of the ground. The Station is studying the insect with the idea of trying biological control.



Figure 84. A typical plant of Devil's Shoestring (*Tephrosia virginiana*) native to Texas, especially the sandy soils, and a source of the standard insecticide known as rotenone which, heretofore, has been imported entirely from South America and other continents. Selections are being made for rotenone content. The breeding work has progressed to the point where the rotenone content has now become as high as 3 to 5 percent in field run material.

PERSONNEL

Texas Agricultural Experiment Station

January 1, 1946

MAIN STATION

Administration:

C. H. McDowell, M. S., Actg. Director
 Edith Siddall, Secretary
 Reed McDonald, Chief Clerk
 E. W. Hooker, Asst. Chief Clerk
 Chester Higgs, Exec. Assistant
 Howard Berry, B. S., Tech. Assistant

Agricultural Engineering:

H. P. Smith, M. S., A. E., Chief
 J. W. Sorenson, Jr., B. S., Agrl. Engr.

Agronomy:

E. B. Reynolds, Ph. D., Chief
 Meta S. Brown, Ph. D., Agron.
 J. W. Collier, B. S., Agron. Corn Breeding,
 (P. O. Temple, Texas)
 R. L. Hensel, M. S., Agron. Pasture Inv.
 R. E. Karper, B. S., Agron. Sorghum Inv.,
 (P. O. Lubbock, Texas)
 D. T. Killough, M. S., Agron. Cotton Breed.
 *C. F. Lewis, M. S., Asst. Agronomist
 *C. W. Manning, M. S., Asst. Agronomist
 *E. S. McFadden, B. S., Assoc. Agron.
 (BPI, SAE)

H. E. Rea, B. S., Agron. Cotton Root Rot
 Inv.

R. G. Reeves, Ph. D., Agron. Corn Inv.
 D. A. Reid, M. S., Agron. Wheat Inv.
 (P. O. Amarillo, Texas)

*T. R. Richmond, M. S., Agron. Cotton Inv.
 (BPI, SAE)

J. S. Rogers, M. S., Agron. Corn Inv.

**J. C. Smith, B. S., Asst. Agronomist

L. J. Starr, M. S., Asst. Agronomist

G. C. Warner, M. S., Asst. Agronomist

*V. V. Parr, B. S., Prin. Soil Conserv.
 (S. C. S.)

Botany:

H. B. Parks, B. S., Botanist, Herbarium

Chemistry:

J. F. Fudge, Ph. D., Chief, State Chemist
 G. S. Fraps, Ph. D., Collab. Chemist
 E. E. Brown, M. S., Asst. Chemist
 Jeanne F. DeMottier, Ph. C., Asst. Chemist

E. J. Deszyck, M. S., Asst. State Chemist

**Paul Kohn, B. S., Asst. Chemist

T. L. Ogier, B. S., Assoc. State Chemist

Raymond Reiser, Ph. D., Assoc. Chemist

W. H. Walker, Analyst

Dairy Husbandry:

O. C. Copeland, M. S., Chief
 W. S. Arbuckle, Ph. D., Assoc. Dairy Mfg.

Entomology:

F. L. Thomas, Ph. D., Chief, State Entom.
 R. K. Fletcher, Ph. D., Entomologist
 J. C. Gaines, Jr., Ph. D., Entomologist
 L. F. Meier, Chief Foulbrood Inspector
 W. L. Owen, Jr., M. S., Entomologist
 (P. O. Terrell, Texas)
 H. J. Reinhard, B. S., Entomologist
 Read Wipprecht, B. S., Entomologist

Farm and Ranch Economics:

L. P. Gabbard, M. S., Chief
 C. A. Bonnen, M. S., Farm Mgt. Res. Spec.
 **P. H. Czarowitz, M. S., Field Asst. Ranch
 Rec.

R. G. Cherry, M. A., Economist
 A. C. Magee, M. S., Econ. Farm Mgt.
 W. E. McCullough, Asst. Ranch Mgt.
 (P. O. Stephenville, Texas)

Joe R. Motheral, M. S., Economist
 W. E. Paulson, Ph. D., Mkt. Res. Spec.

Feed Control Service:

F. D. Brock, Ph. G., Chief
 M. P. Holleman, Asst. Chief
 F. D. Fuller, M. S., Supr. Feed Inspectors
 J. M. Crisp, Feed Inspector
 K. L. Kirkland, B. S., Feed Inspector
 P. A. Moore, Feed Inspector
 S. D. Reynolds, Jr., Feed Inspector
 H. M. Thompson, Feed Inspector
 H. G. Wickes, D. V. M., Feed Inspector
 U. S. Wright, Feed Inspector

Horticulture:

S. H. Yarnell, Sc. D., Chief
 W. H. Brittingham, Ph. D., Horticulturist

Main Station Farm:

J. E. Roberts, B. S., Superintendent

Plant Pathology and Physiology:

A. A. Dunlap, Ph. D., Chief
 *L. M. Blank, Ph. D., Plant Path. (BPI,
 SAE)

*D. R. Egle, Ph. D., Chemist (BPI, SAE)

*F. M. Eaton, Ph. D., Plant Physiol. (BPI,
 SAE)

Paul J. Talley, Ph. D., Plant Path.

Poultry Husbandry:

R. M. Sherwood, M. S., Chief
 C. W. Carter, M. S., Asst. Poultry Husb.

**J. R. Couch, M. S., Poultry Husb.

L. E. James, M. S., Assoc. Poultry Husb.

V. H. Melass, Ph. D., Poultry Husbandman

Publications:

Tad Moses, Chief

Range Animal Husbandry:

J. M. Jones, M. A., Chief
 R. O. Berry, Ph. D., Assoc. Geneticist
 S. P. Davis, Wool and Mohair Spec.
 J. H. Jones, B. S., Animal Husb.
 R. E. Patterson, Ph. D., Animal Husb.
 B. L. Warwick, Ph. D., Geneticist

Rural Home Research:

Jessie Whitacre, Ph. D., Chief
 Sylvia Cover, Ph. D., Foods Spec.
 Mary Anna Grimes, M. S., Textile and
 Clothing Spec.

Soil Survey:

*E. H. Templin, B. S., Soil Sci. (BPI, SAE)

*Harvey Oakes, B. S., Soil Sci. (BPI, SAE)

**A. L. Nabors, M. S., Soil Surveyor

*A. E. Shearin, B. S., Soil Sci. (BPI, SAE)

Swine Husbandry:

Fred Hale, M. S., Chief
C. M. Lyman, Ph. D., Swine Nutritionist

Veterinary Science:

H. Schmidt, D. V. M., Chief
W. A. Boney, D. V. M., Poultry Vet.
C. O. Morgan, D. V. M., Veterinarian
P. B. Pearson, Ph. D., Nutritionist
J. L. West, D. V. M., Veterinarian

Wildlife Research:

*W. P. Taylor, Ph. D., Chief (Dept. Int.)
*W. B. Davis, Ph. D., Asst. Leader (Dept. Int.)

Members of Teaching Staff Carrying Cooperative Projects on the Station:

S. W. Bilsing, Ph. D., Entomology
F. R. Brison, M. S., Horticulture
A. L. Darnell, M. A., Dairy Husb.
V. A. Little, M. S., Entomology
P. T. Montfort, B. S., Ag. Eng.

SUBSTATIONS**No. 1, Beeville, Bee County:**

R. A. Hall, B. S., Supt.
**E. M. Neal, B. S., Animal Husbandman
Lucas Reyes, Animal Husbandman

No. 2, Tyler, Smith County:

*P. R. Johnson, M. S., Supt. (S. C. S.)
*J. B. Pope, M. S., Project Leader (S. C. S.)
*O. C. Word, Jr., B. S. C. E., Agrl. Eng. (S. C. S.)

No. 3, Angleton, Brazoria County:

W. F. Turner, B. S., Supt.
H. M. Reed, B. S., Horticulturist
J. J. Reid, D. V. M., Animal Path.
J. S. Williams, M. A., Agronomist
*O. W. Olsen, Ph. D., Asst. Parasitologist (B. A. I.)
**C. A. Woodhouse, D. V. M., M. S., Parasitologist

No. 4, Beaumont, Jefferson County:

R. H. Wyche, B. S., Supt.
**C. E. Minarik, Ph. D., Plant Physiol.
*H. M. Beachell, M. S., Assoc. Agron. (BPI, SAE)
*E. C. Tullis, Ph. D., Plant Path. (BPI, SAE)

No. 5, Temple, Bell County:

*H. O. Hill, B. S., Supt. (S. C. S.)
B. D. Hargrove, M. S., Agronomist
*J. R. Johnston, Ph. D., Assoc. Soil Sci. (S. C. S.)
E. W. Lyle, Ph. D., Plant Pathologist

No. 6, Denton, Denton County:

P. B. Dunkle, M. S., Supt.
*I. M. Atkins, Ph. D., Agron. (BPI, SAE)

No. 7, Spur, Dickens County:

*R. E. Dickson, B. S., Supt. (S. C. S.)
*C. E. Fisher, M. S., Agronomist (S. C. S.)
*P. T. Marion, M. S., Agt. Nutr. Inv. (B. A. I.)

No. 8, Lubbock, Lubbock County:

D. L. Jones, Supt.
H. D. Lynn, B. S., Agronomist

No. 9, Balmorhea, Reeves County:

John J. Bayles, B. S., Supt.

No. 10, College Station, Brazos County:

R. M. Sherwood, M. S., In Charge
L. J. McCall, Farm Supt.

No. 11, Nacogdoches, Nacogdoches County:

H. F. Morris, M. S., Supt.

No. 12, Chillicothe, Hardeman County:

*J. Roy Quinby, M. S., Supt. (BPI, SAE)
*J. C. Stephens, M. A., Assoc. Agron. (BPI, SAE)

No. 14, Sonora, Sutton-Edwards Counties:

W. H. Dameron, B. S., Supt.
I. B. Boughton, D. V. M., Veterinarian
O. L. Carpenter, Breeding Supervisor
W. T. Hardy, D. V. M., Veterinarian
L. B. Merrill, B. S., Range Botanist

No. 15, Weslaco, Hidalgo County:

W. H. Friend, B. S., Supt.
G. H. Godfrey, Ph. D., Plant Pathologist
B. S. Pickett, Ph. D., Horticulturist
Raymond Roberts, M. Sc., Entomologist

No. 16, Iowa Park, Wichita County:

L. E. Brooks, B. S., Supt.
V. I. Woodfin, B. S., Horticulturist

No. 17, Ysleta, El Paso County:

S. E. Jones, Ph. D., Supt.
Guy Fortenberry, B. S., Animal Husb.
P. J. Leyerly, Ph. D., Cotton Breeder
Lee S. Stith, M. S., Agronomist

No. 19, Winter Haven, Dimmit County:

E. Mortensen, B. S., Supt.
E. T. Hibbs, M. S., Entomologist
T. J. Nugent, M. S., Plant Pathologist
Bruce A. Perry, Ph. D., Horticulturist

No. 20, Stephenville, Erath County:

B. C. Langley, M. S., Supt.
T. E. Denman, B. S., Horticulturist

FIELD LABORATORIES**Apicultural Research, San Antonio, Rt. 1, Box 368:**

A. H. Alex, B. S., Acting Chief
C. J. Burgin, B. S., Queen Bee Breeder

East Texas Pasture Inv., Lufkin:

W. E. Roane, B. S., Agron. in Charge.

Loco Weed Research, Alpine:

Tomato Disease Investigations, Jacksonsville:
P. A. Young, Ph. D., Plant Pathologist

Tomato Disease Investigation, Yoakum:

Tomato Investigations, Robertson County:
M. D. Bryant, M. S., Horticulturist in Chg.

Fruit Investigations, Montague:

U. A. Randolph, M. S., Horticulturist

Sweet Potato Investigations, Gilmer:

Ralph Michael, B. S., Horticulturist in Chg.

Amarillo Soil Conservation Station, Amarillo:

*C. J. Whitfield, Ph. D., Project Supervisor (S. C. S.)

*M. L. Arnold, Cooperative Agent (S. C. S.)

*Carl Reeder, Cooperative Agent (S. C. S.)

*James W. Walton, Asst. Animal Husband. (S. C. S.)

Cotton Insect Investigations, Brownsville:

*A. J. Chapman, Assoc. Ent. (BEPQ)

Cotton Insect Investigations, Fabens:

*L. W. Noble, Assoc. Ent. (BEPQ)

Livestock Feeding Investigations, Big Spring:

*F. E. Keating, B. S., Assoc. Agron. (BPI, SAE)

Livestock Feeding Investigations, Falfurrias:

*Lowell H. Tash, B. S. A., Animal Husband. (B. A. I.)

*in coop. with USDA.

**On leave.

Cooperating Agencies

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